Conectividad Alegal:
Remaking and Resilience in the Bay of Havana

by

Lucas F. Igarzábal
Bachelor of Design in Architecture
University of Florida 2017

Marisa Concetta Waddle
Bachelor of Design in Architecture
University of Florida 2017

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Signature of Author: ____
Department of Architecture
May 25, 2021

Certified by: ____
Hans Tursack
Lecturer
Thesis Supervisor

Accepted by: ____
Leslie K. Norford
Professor of Building Technology
Chair, Department Committee on Graduate Students

Advisor

Hans Tursack
Lecturer

Readers

Axel Kilian, PhD
Visiting Assistant Professor

Marie Law Adams, AIA
Lecturer in Urban Design

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A thesis by *Lucas F. Igarzábal & Marisa Concetta Waddle*

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This thesis investigates the rapid rate at which the changing of ownership, production, and policy has affected the Bay of Havana. In 2009, the Cuban government designated a single free port on the island just 40 kilometers west of the Bay. The Mariel marked an era of economic restructuring, a common occurrence in the past century. These policy changes aim to ease the day-to-day lives of Cuban citizens but also leave them vulnerable to foreign industries who seek to mine the area for its unregulated resources, cheap labor, and proximity to US trade flows. The Bay, as a site of this intense geopolitical speculation and aging infrastructure, is emblematic of Cuba as a whole.

The Bay, bracketed by an inoperable oil refinery and a degrading thermoelectric plant, is currently characterized by abandoned industry. While these forgotten sites restrict pedestrian access and foster pollution, they provide a critical connection to the shoreline, and therefore to the world at-large. The project is a speculation of a future that aims to return this site to its citizenry. It argues for the Cuban philosophy of resolver to leverage the resilient culture of Havana's citizens against foreign opportunism. It explores the transformation of the site over the next five decades, as it adapts to the ever-changing economic, social, and political landscape of the country. The project salvages key components of the site, as opposed to depleting it of its resources. It develops new industries along the entire shore, adapted from abandoned factories, which circumvent material scarcity and access restrictions. The thesis operates between Havana's historic ebb and flow of scarcity and surplus, defining a new vernacular of grassroots urbanism.

Thesis Advisor: *Hans Tursack*
Title: *Lecturer*

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Table of Contents

Key Terms

Alegal	**Illegal against code of law yet socially acceptable and readily practiced.**
Art of Resolver	**The possibilities inherent in navigating around bureaucratic rationality.**
Criollo/a	**Locally made/culturally rooted; vernacular to this particular place.**
Conseguir	**Signifies the need to spend tremendous time to find items that cannot be bought in normal stores.**
Inventar	**The need to invent things that do not exist or to invent one's way around repressive systems.**

Our thesis investigates the rapid rate at which the changing of ownership, production, and policy have affected the Bay of Havana in Cuba at an infrastructural scale.

Part I: Crossroads

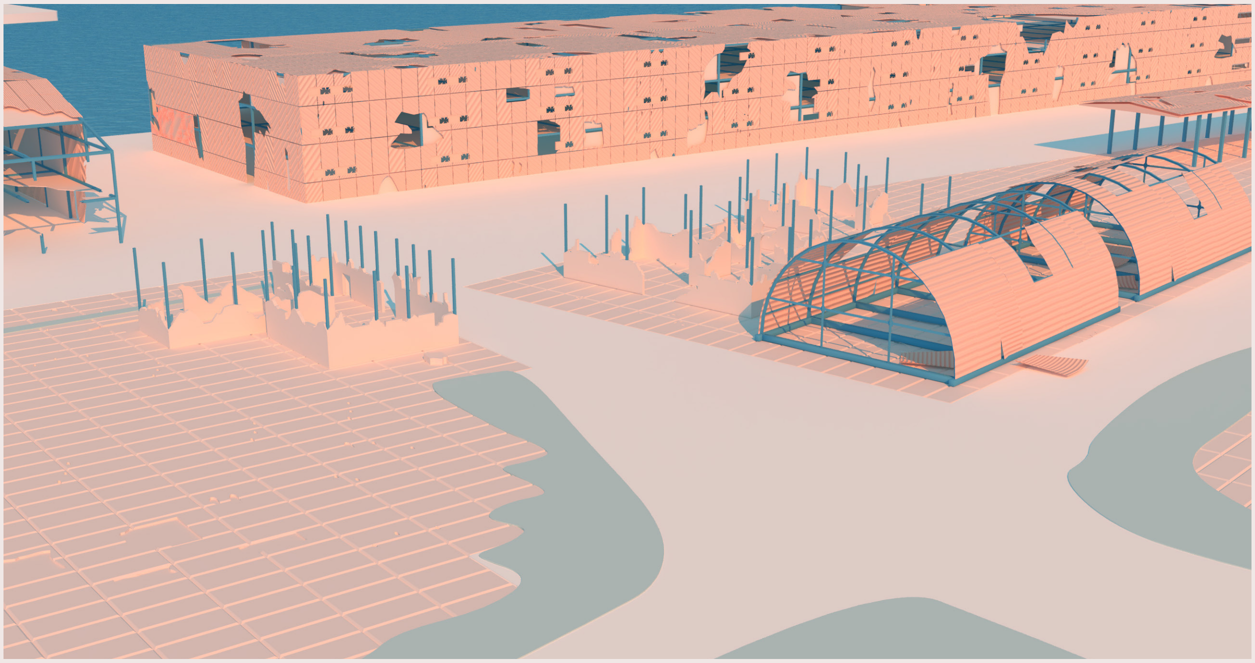


Fig. 1 *The site left in abandon.*

On the north side of the Bay of Havana, less than two miles from the city center, 100 hectares of land is cut off from its residents. Punta Marti is nestled in between an inoperable oil refinery and a degrading thermoelectric plant, industrial relics which block pedestrian access with imposing structures and free-flowing pollutants.

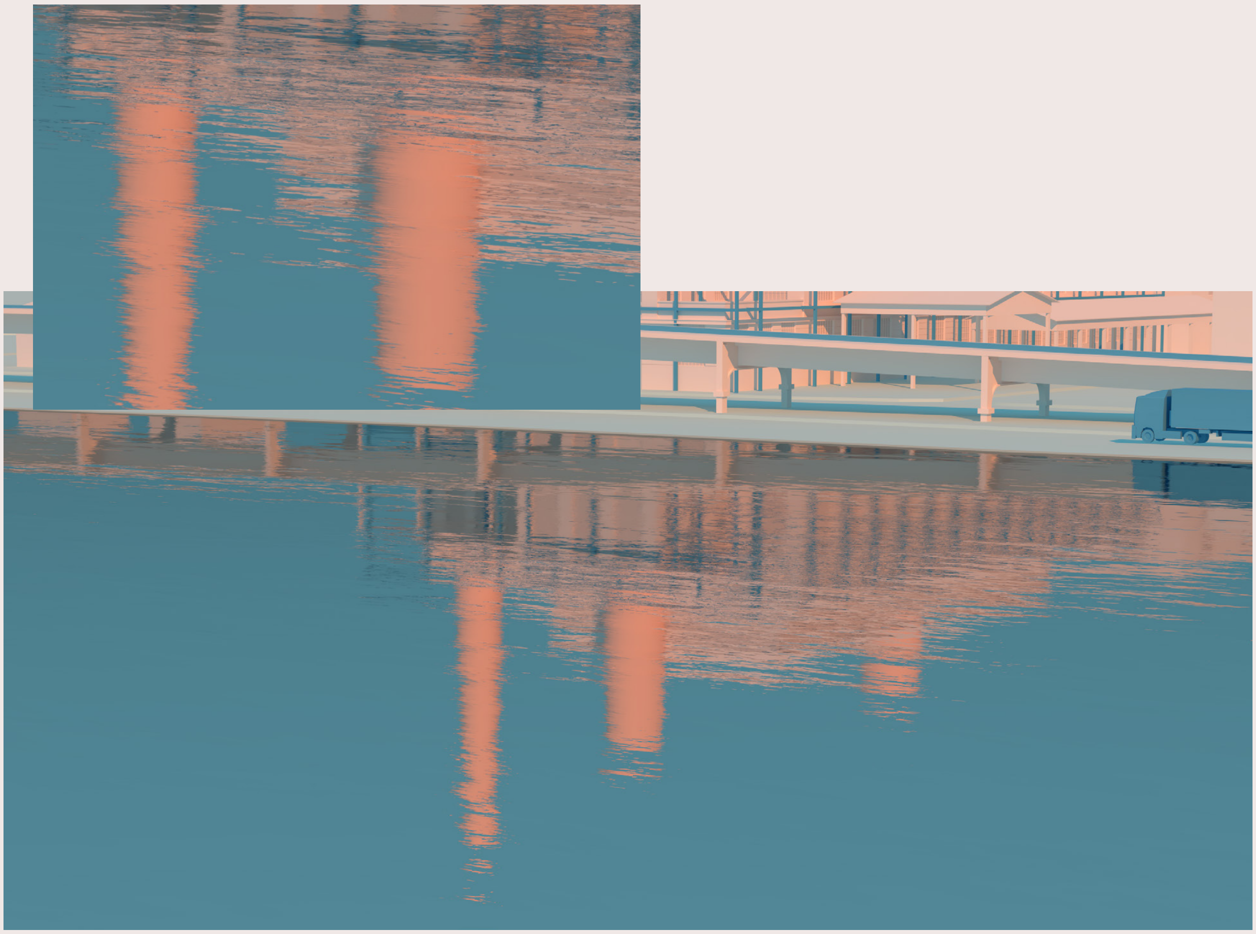


Fig. 2 *Tallepiedra Thermoelectric Plant leaking*.

Since its construction in 1914, the Tallapiedra thermoelectric plant has supplied electricity to over 2 million residents in Cuba's capital city. By 2021, leaking gas and unstable structure have slowly rendered it unusable, and it now stands on the verge of collapse. But at Punta Marti, ruin is intrinsically linked to recovery. Havana, and Cuba as a whole, has a tradition of resilience in the face of extreme scarcity, a philosophy known as resolver.

Fig. 3 *With Our Own Efforts (Left)* , printed manual, 1992.
The Family Book (Right), printed manual, 1991.

In the 1990s, the Cuban Revolutionary Armed Forces fostered this “ethos of tenacity” with the distribution of manuals, which included instructions for at-home improvements on everything from foodstuffs to appliances.

Fig. 4 *Urban farming in Havana*, photograph with drawing overlay, 2018.

This culture of resilience continued to grow. In the twenty-first century, limited by petroleum and pesticide shortages, Cuban citizens began to resolver new forms of agriculture.

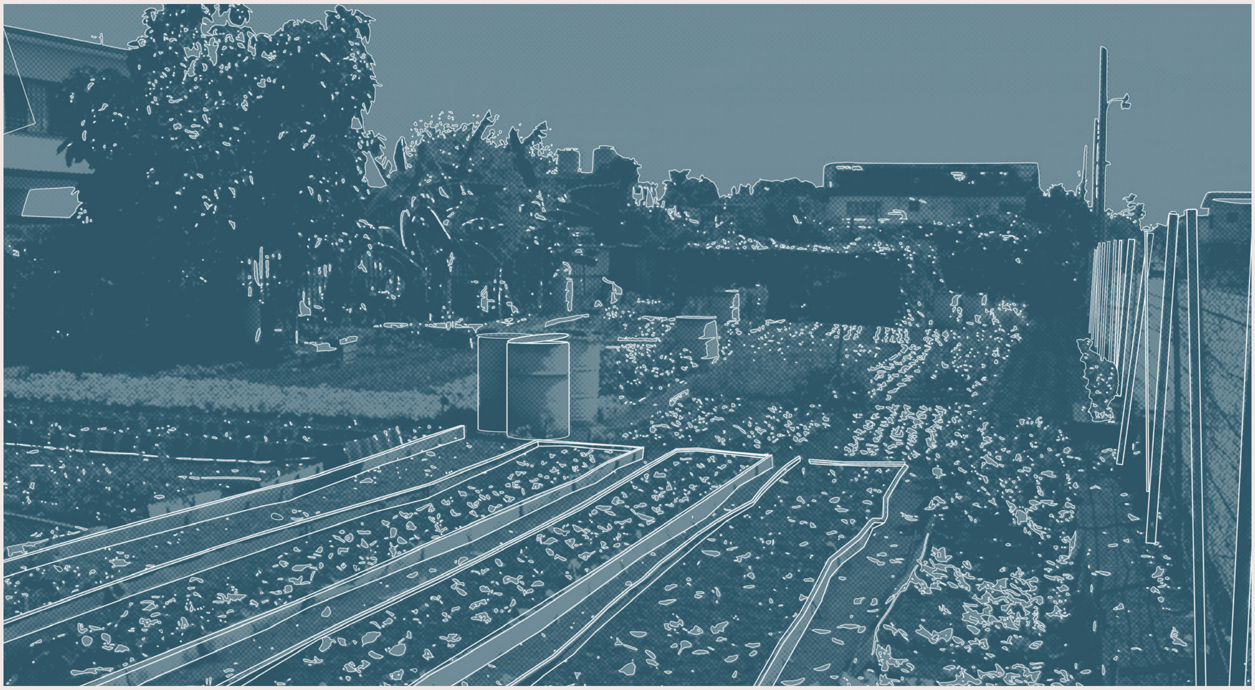


Fig. 5 *Urban farming in Havana*, photograph with drawing overlay, 2019.

Today, over 8,000 urban farms cover 35,000 hectares of land on formerly vacant lots across the nation.

Fig. 6 *The Bay of Havana*.

Resolver can be applied across the Bay of Havana, which, as a site of geopolitical speculation and aging infrastructure, is emblematic of Cuba as a whole.

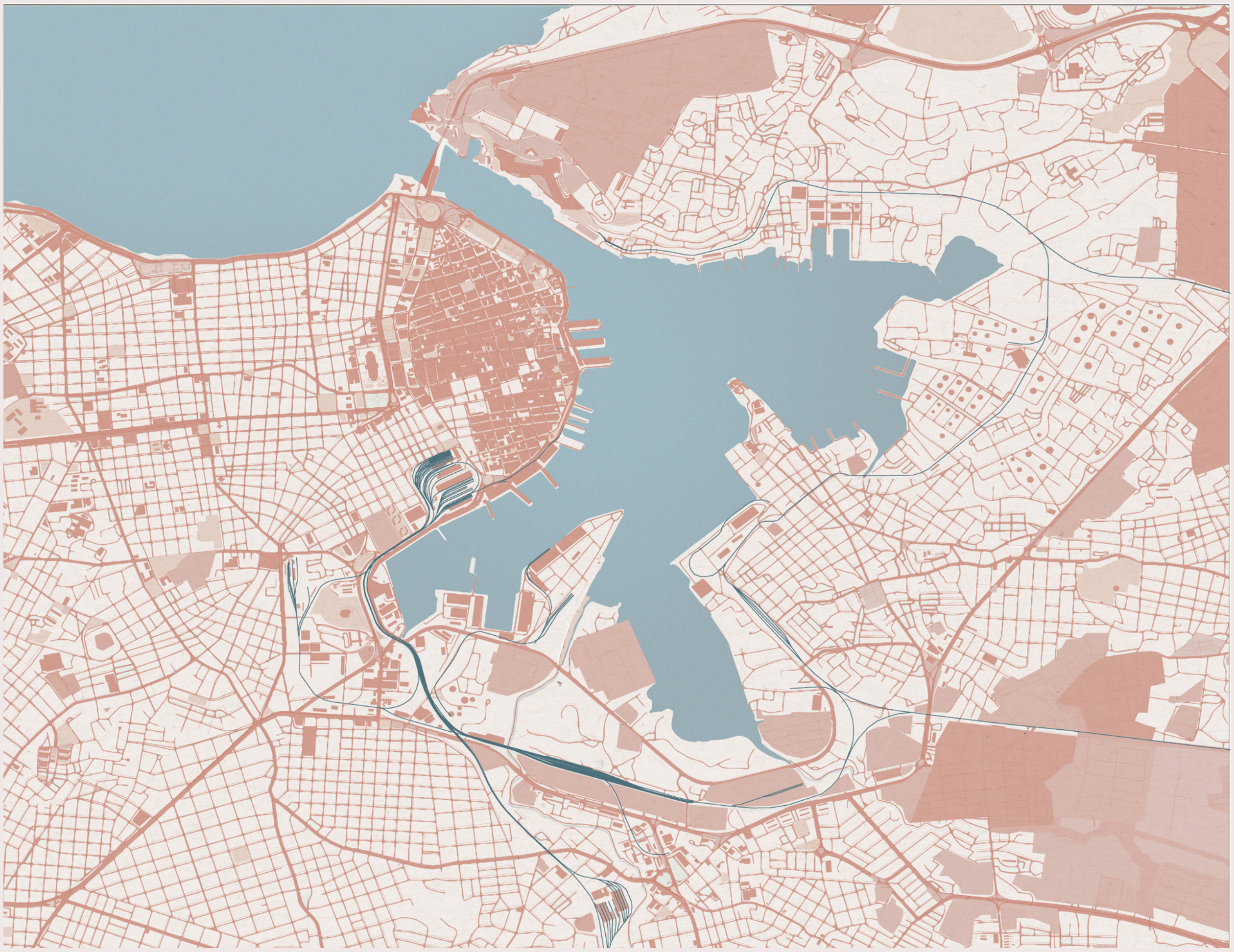


Fig. 7 *The Bay of Havana.*

Due to lack of land and resources, neighborhoods are densified inwards. Houses are atomized into smaller units called Barbacoas, each of which correspond to a specific 'zone' in the Bay.

Fig 8. *Zones 1-4 in the Bay of Havana.*

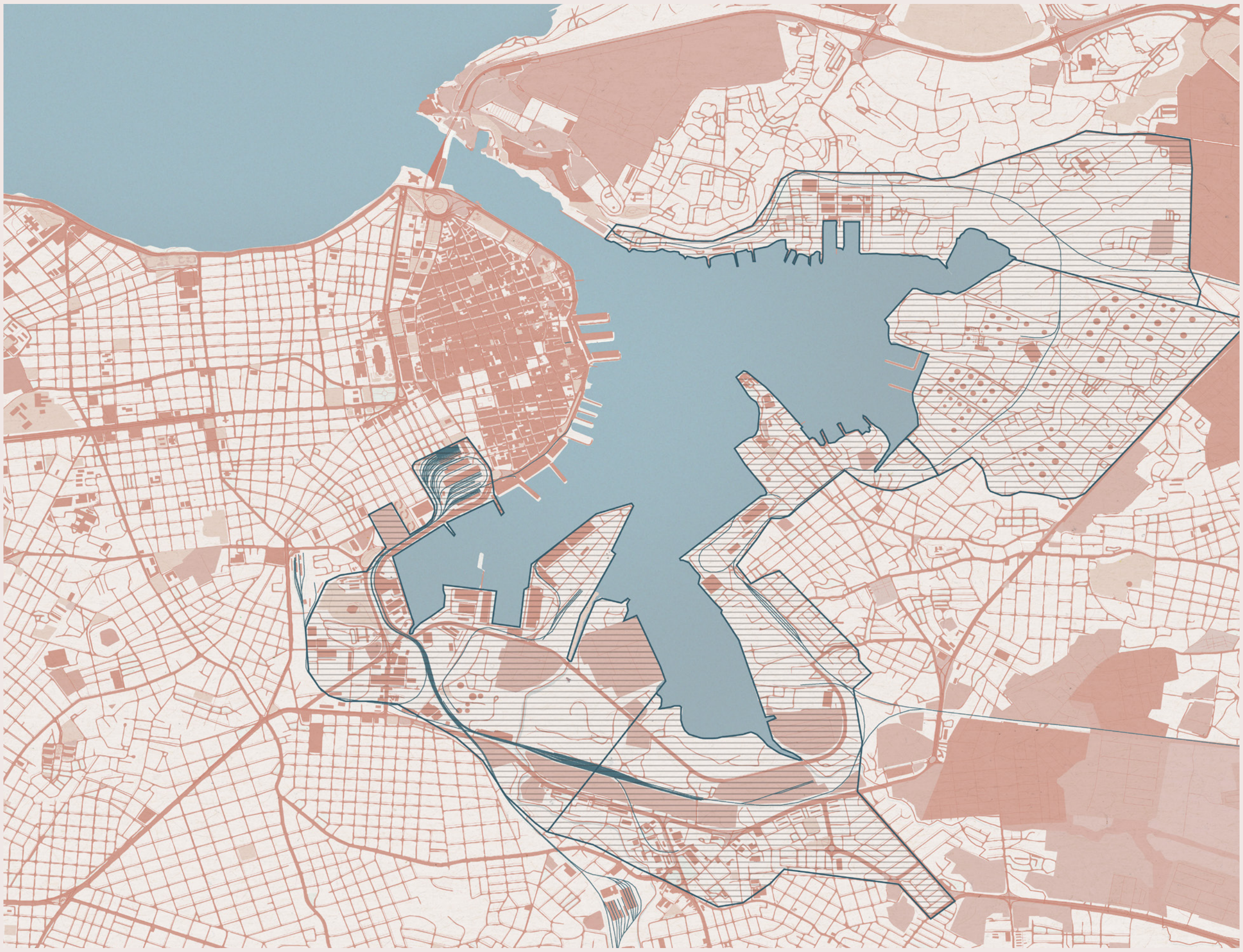


Fig 9. *Zones 1-4 in the Bay of Havana.*

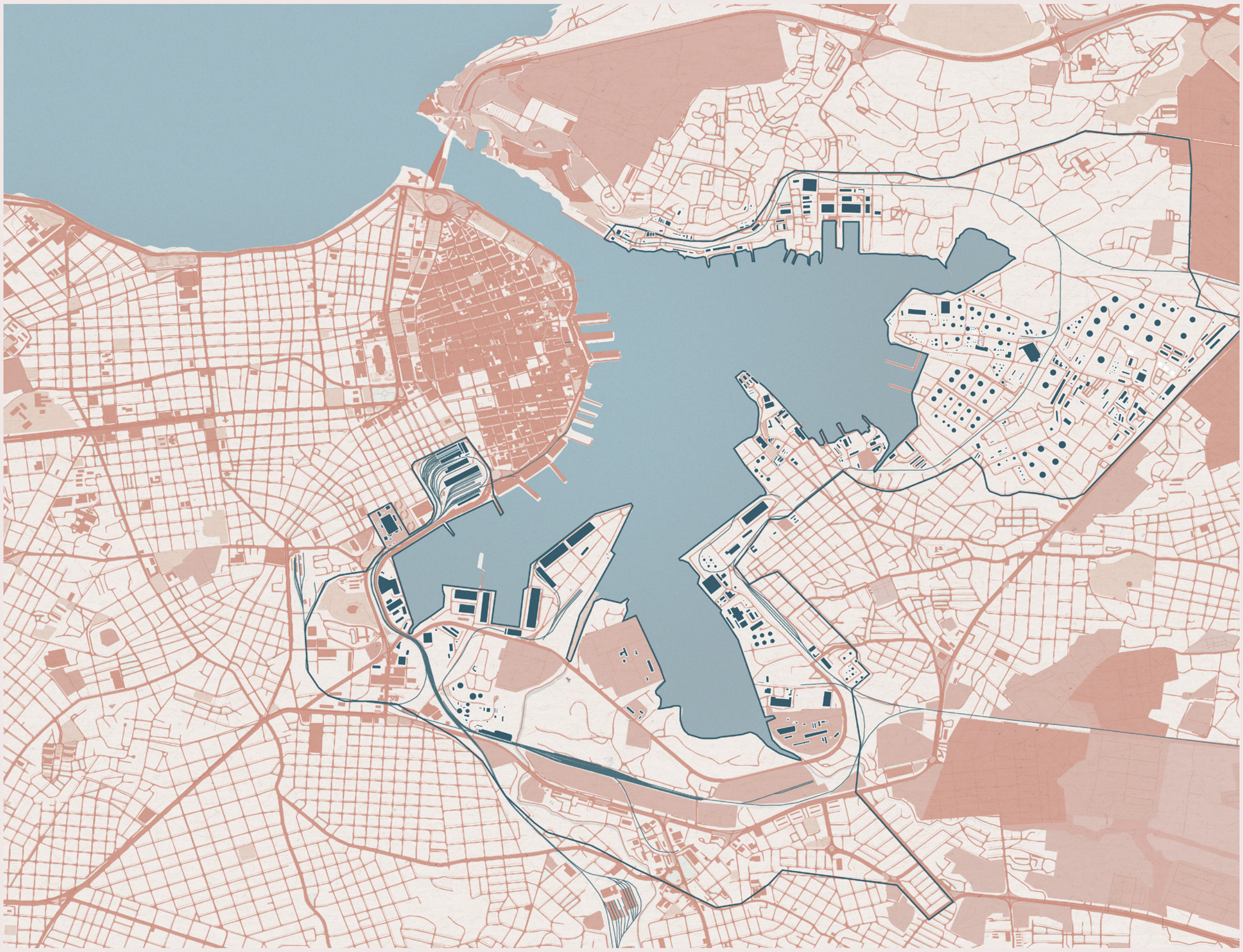


Fig. 10 *Industries left in Abandon in the Bay of Havana.*

Each 'zone' is currently defined by a collection of obsolete industries. While these sites of abandon restrict pedestrian access and foster pollution, they might finally provide a unique opportunity for citizens to expand outward instead of inwards.

Fig. 11 Exploded Axon of Zones, Railway, & Usable Industrial Objects.

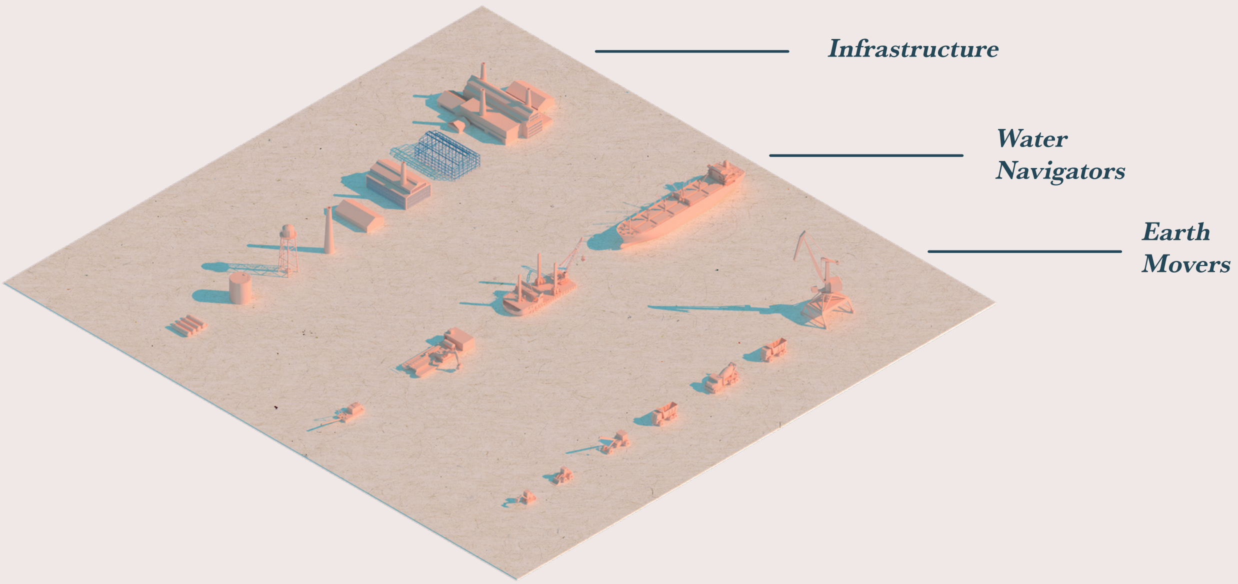


Fig.12 *Found Objects of Industry*.

Fig. 13 *Port of Mariel with Map,* photograph with drawing overlay.

These zones are just 40 kilometers east of the Port of Mariel, the island's sole free port, where, since 2009, imported goods have been exempt from customs tariffs. Both foreign investment and domestic industry are now concentrating in the Mariel, leaving the Bay of Havana, and the rest of the country, vulnerable to abandonment.

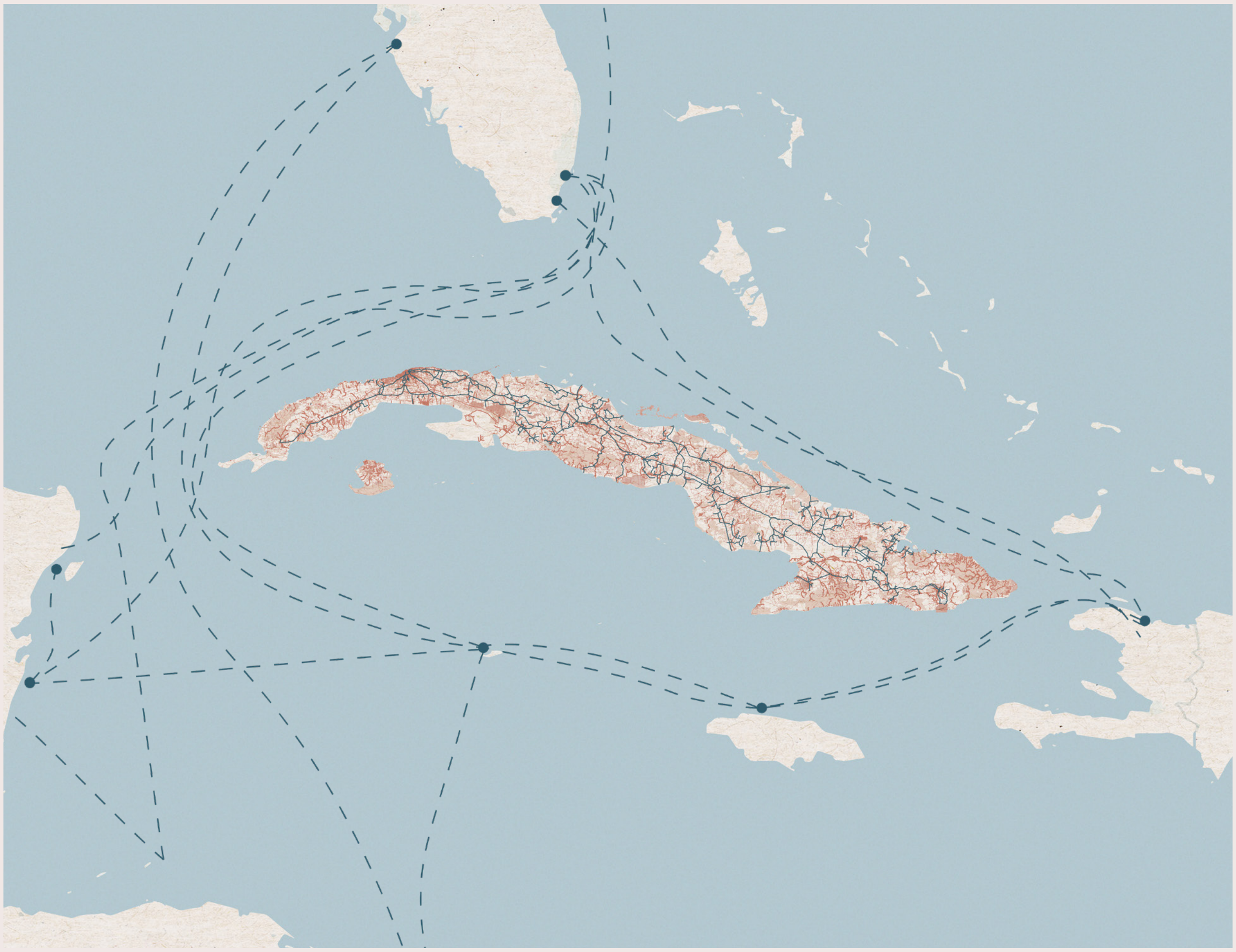


Fig. 14 *Cruise Routes Map*.

The Republic of Cuba is located in the center of the Caribbean, at the nexus of 70% of global cruise routes. The island is separated from its largest neighbor, the United States, by the 150-km-wide Straits of Florida.

Fig. 15 *US Embargo - Helms Burton Act of 1996.*

But it is also separated economically by the US Embargo against Cuba (fade cruise lines). Introduced in 1958, the Embargo initially limited only US investment (add embargo lines). However, the 1996 Helms-Burton Act expanded this legislation to ban all foreign investment, effectively cutting Cuba off from the rest of the world.

Fig. 16 *Advancements in Medical Research in Cuba*, photograph with drawing overlay.

In reaction to the Embargo, the Cuban government invested heavily in its own industries, pushing for advancements in medicine and bio-genetic research. There is now a surplus of scientific skill and medical technologies on the island , one of many untapped resources vulnerable to exploitation.

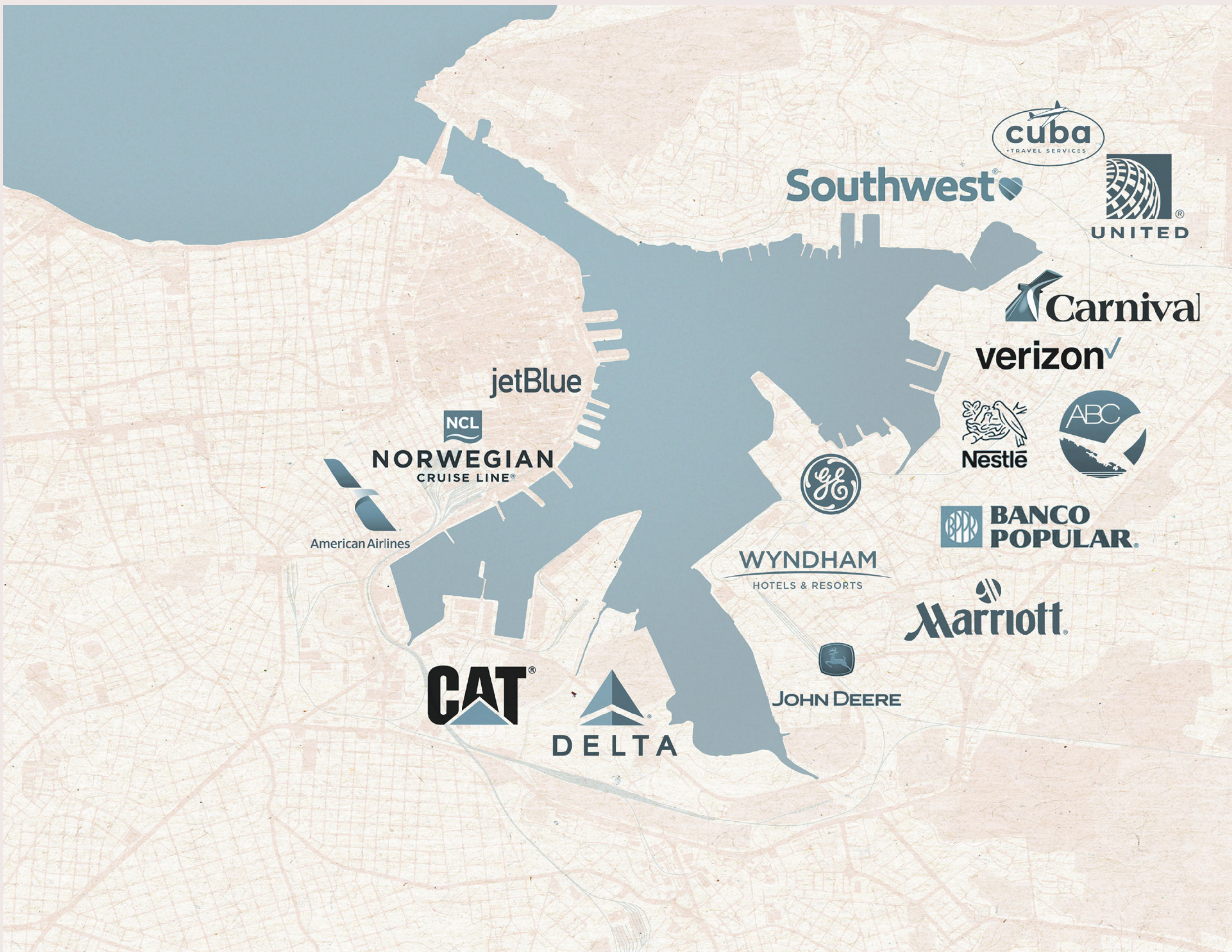


Fig. 17 *Foreign Opportunism in the Bay of Havana.*

Foreign industries seek to mine Cuba not only for this underutilized expertise, but also for its unregulated resources, cheap labor, and proximity to US trade flows. The country, and the Bay of Havana is at a crossroads: it could decay ad infinitum, or it could succumb to a parasitic redevelopment for tourism.

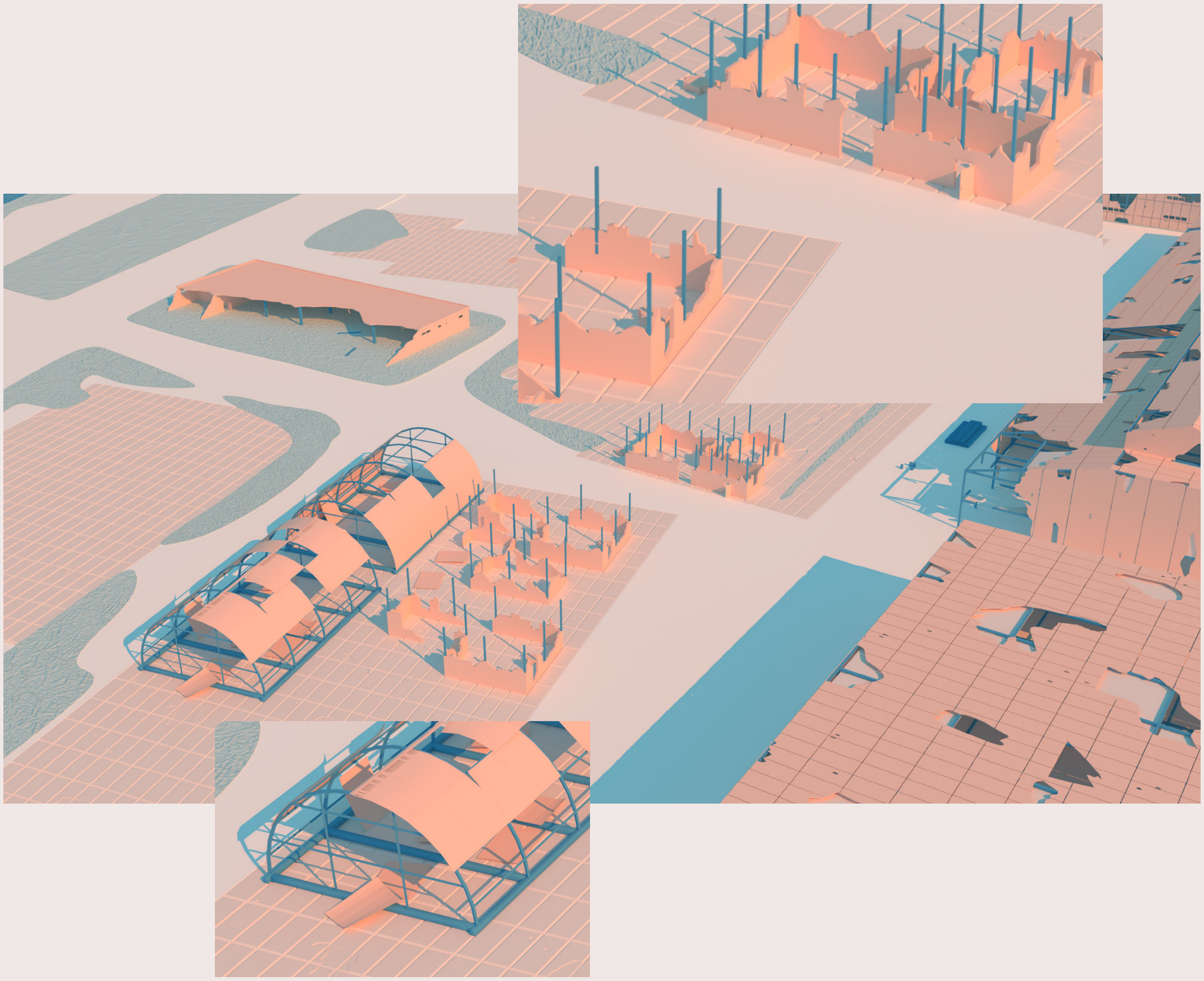


Fig.18 *The site left in abandon.*

This thesis proposes a third alternative, where, despite the continuation of the US Embargo, the Bay begins to leverage the resilient culture of its citizens against foreign opportunism.

Part II: Turning Point

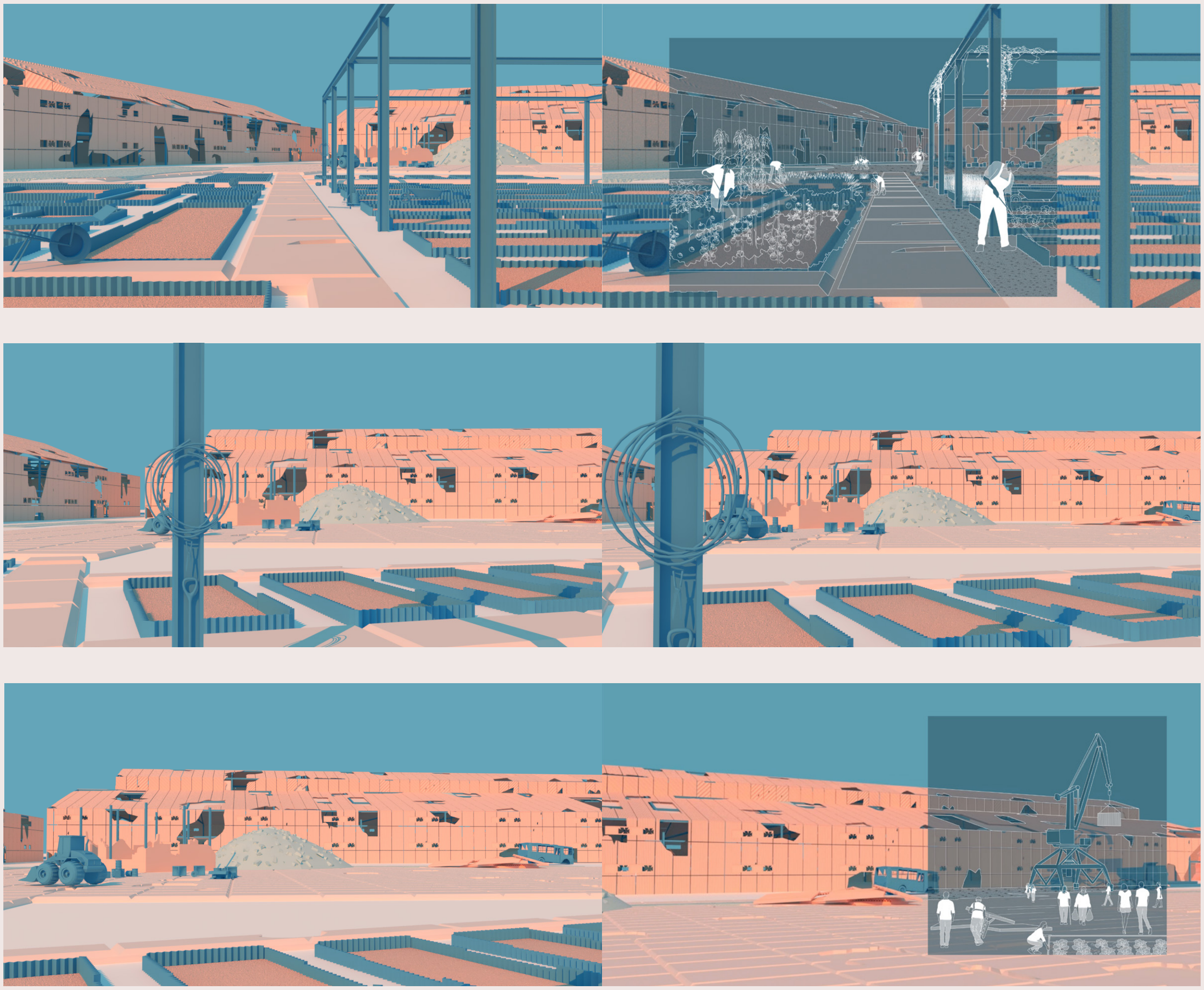


Fig. 19 *Urban Farming*, animation stills.

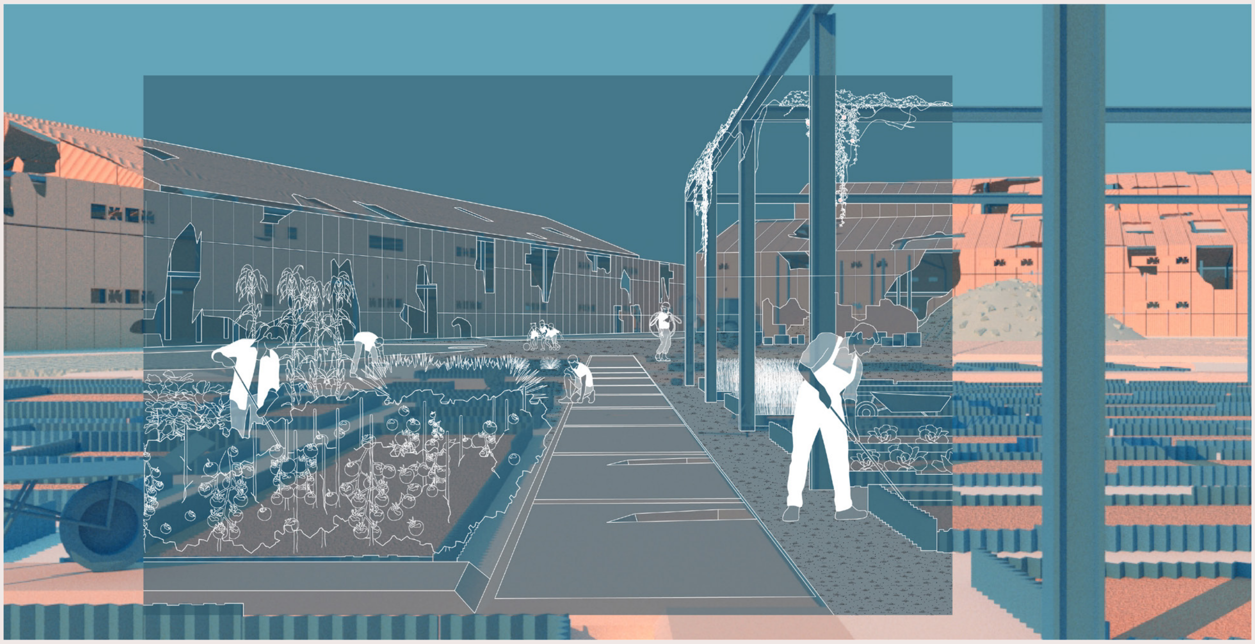


Fig. 20 *Uban Farming*, animation still with drawing overlay.

Five years after Raul Castro retired as head of Cuba's Communist Party, La Granja descends upon the Tallapiedra Plant. Brick by brick, the collective demolishes the plant's Station 6 until it is nothing more than a rust-covered skeleton.

Once Havana's largest farming collective has dismantled the structure, the land will be re-imagined into a series of small community farms.

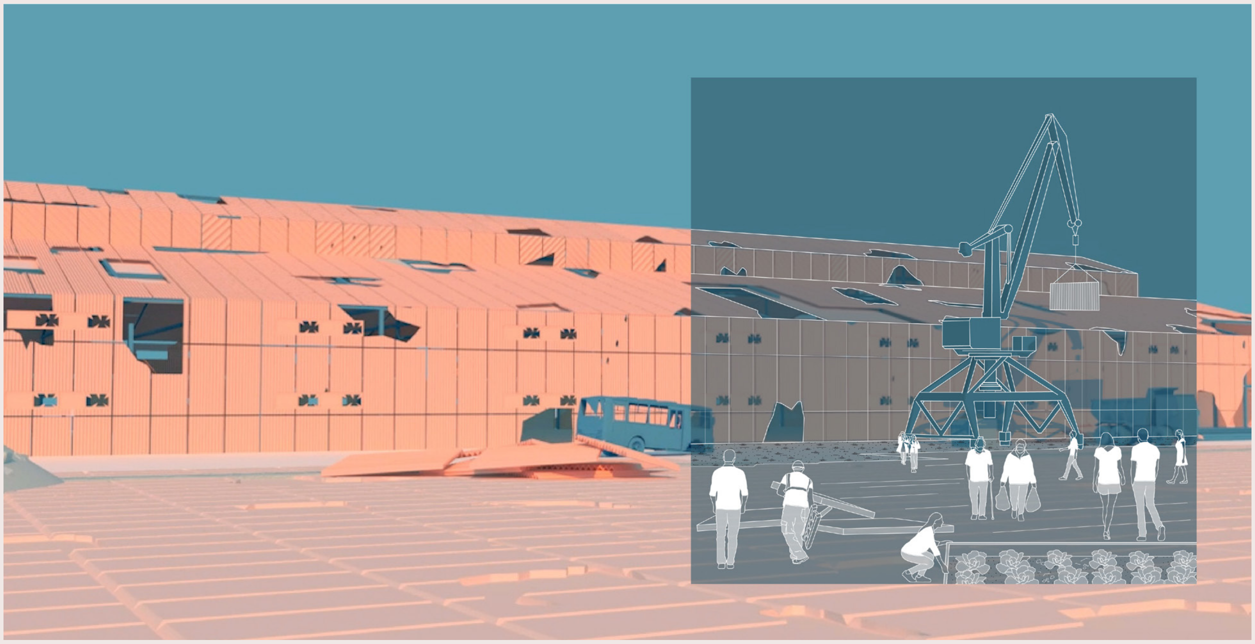


Fig. 21 *Crane Lifting Old Material*, animation still with drawing overlay.

Station 6 will follow in the footsteps of the recently reclaimed Nico Lopez Oil Refinery, an aging complex whose deconstruction reconnected the Coubre neighborhood to the water's edge.

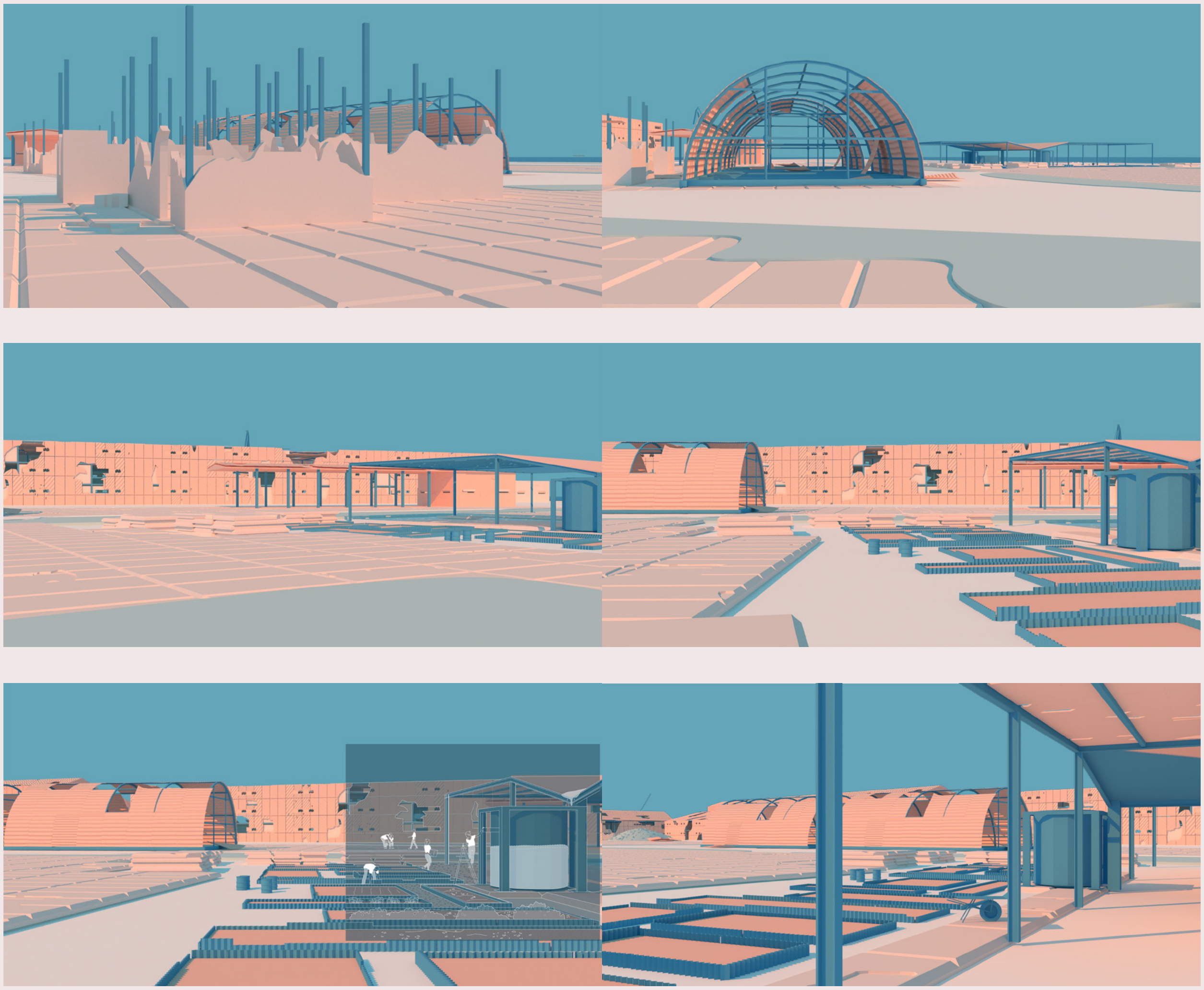


Fig. 22 *Water Collection*, animation stills.

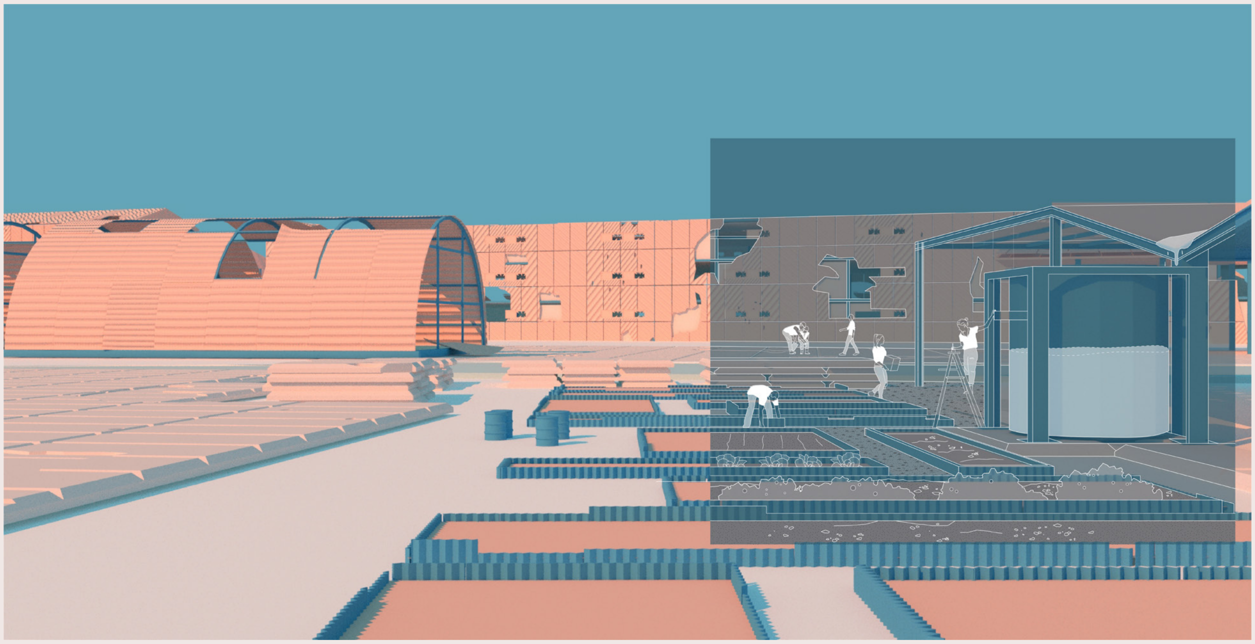


Fig. 23 *Farming & Water Collection*, animation still with drawing overlay.

As the group descends upon the industrial wreckage, they catalog the fallen pieces, taking careful note of the scrap's material and structural properties, quietly logging how each I-beam, concrete panel, or wood post will be adapted in the zone's reconstruction.

Fig. 24 *Ariel View of Phase II*, animation still.

With local resources and resolver, the Marti community begins to reclaim their site.

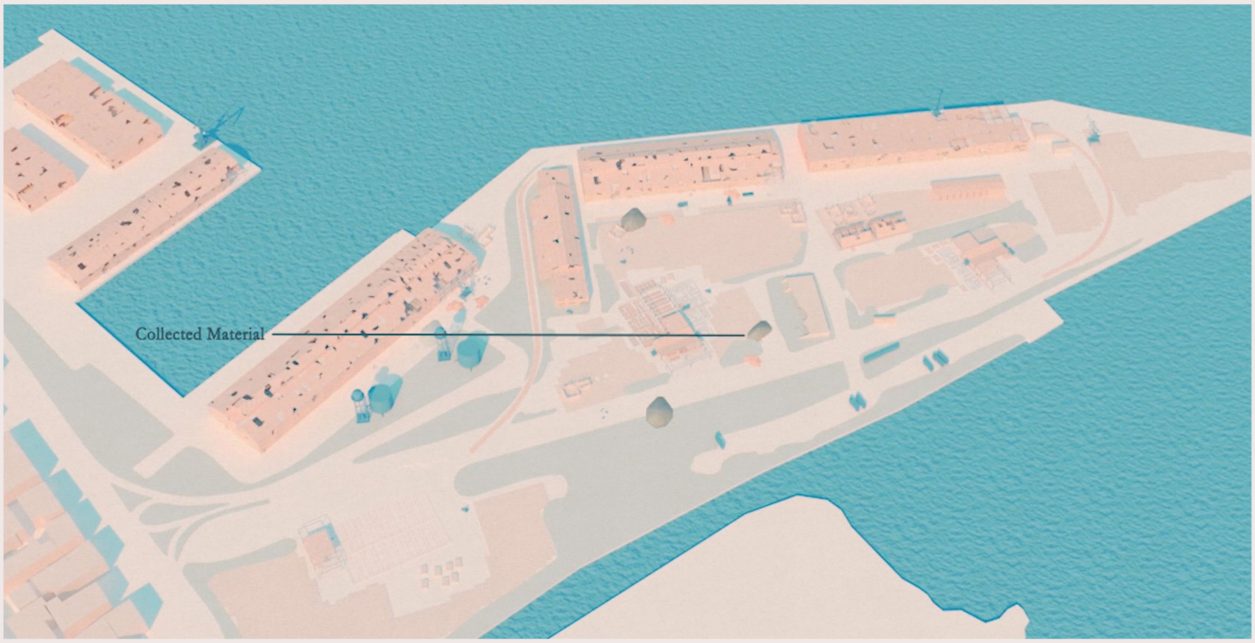


Fig. 25 *Ariel View of Phase II*, animation still.

Part III: Expansion

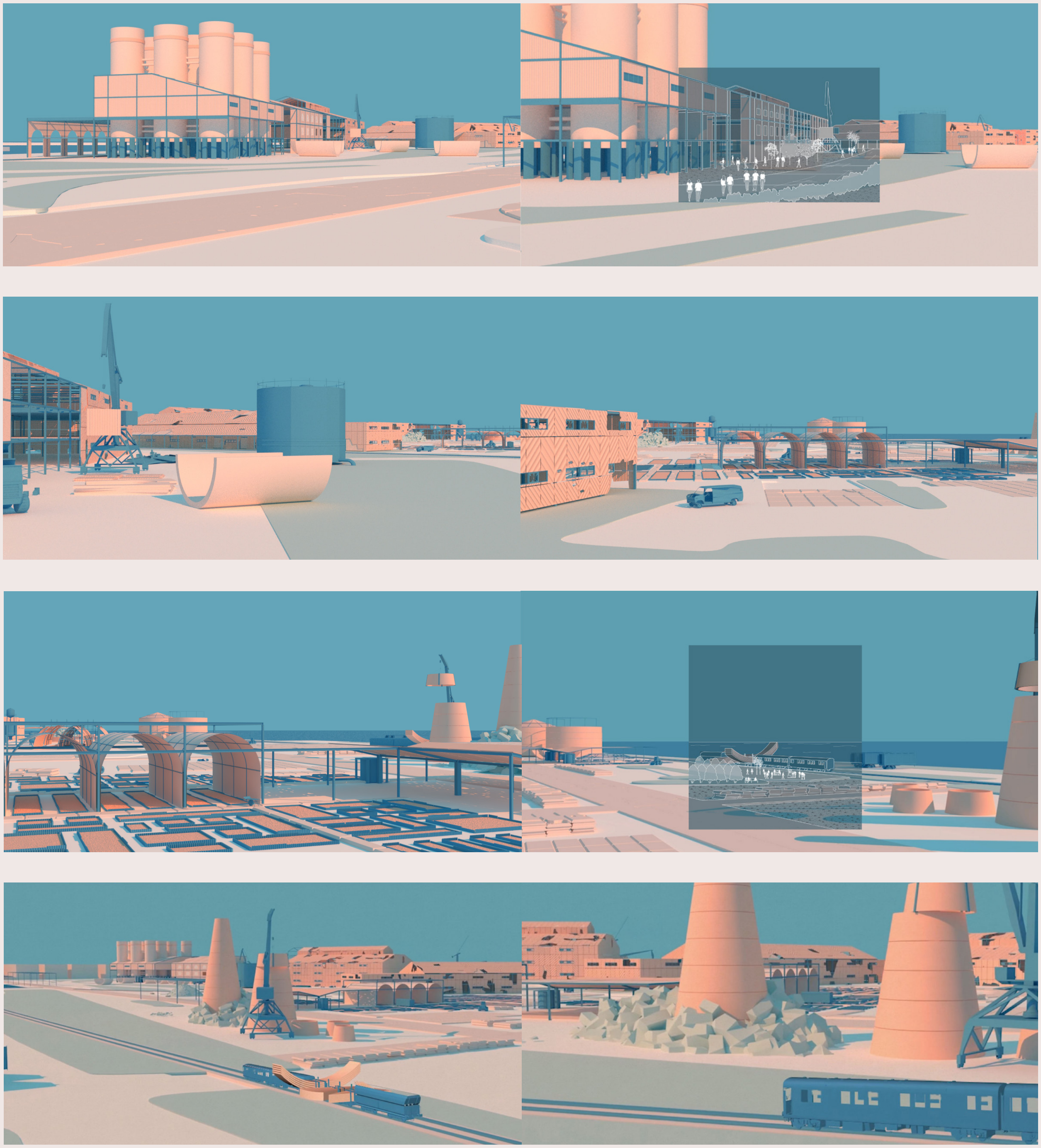


Fig. 26 *Introduction of Biogen Labs & Expansion of Farming*, animation stills.

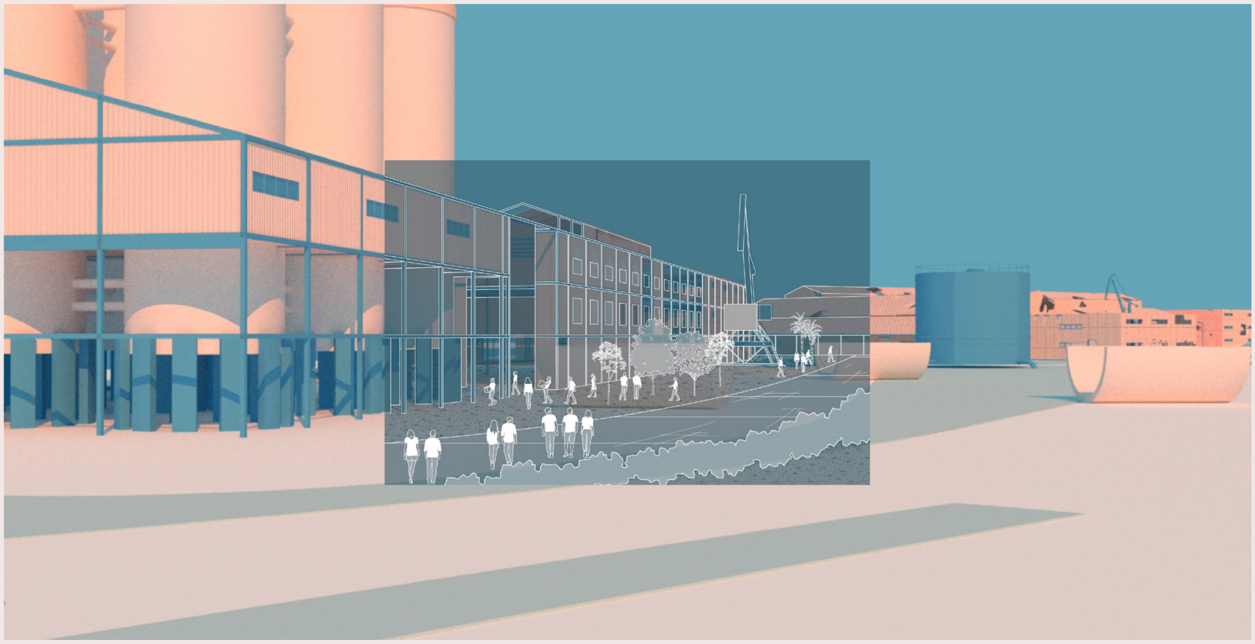


Fig. 27 *Introduction of Biogen Labs*, animation still with drawing overlay.

The Zone retains its industrial heritage as a DNA research facility begins to take shape. The facility harnesses the unique expertise of biogenetic scientists already in surplus on the island, a proprietary industry that offers Cuba a global brand beyond exploitative tourism.

Fig. 28 *Transportation of Construction Materials*, animation still with drawing overlay.

The community also repairs the once-defunct rail line using I-beams from the Tallapiedra plant, reconstituting an infrastructure which allows for on-site transportation of whole-scale industrial objects.

Fig. 29 *Ariel View of Phase III*, animation still.

After careful soil remediation, the raised beds of the urban farms are able to mature into larger fields, supplying crops for local distribution using the expanded railway. These new pathways increase the porosity of the site, inviting citizens to explore and affect the changing landscape.

Fig. 30 *Ariel View of Phase III*, animation still.

Fig. 31 *Ariel View of Phase III*, animation still.

Fig. 32 *Ariel View of Phase III*, animation still.

Part IV: Reinvention

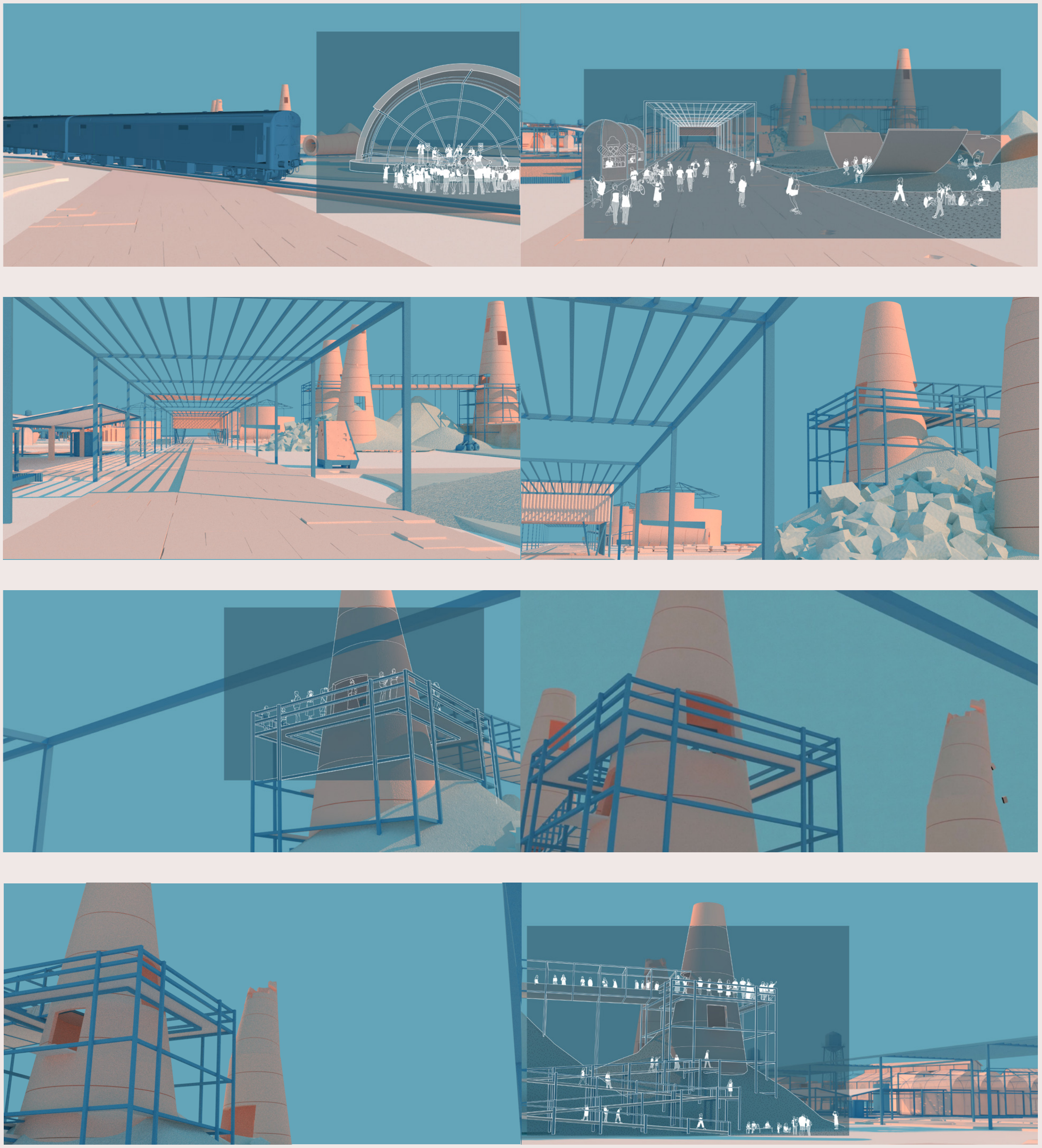


Fig. 33 *Recreation*, animation stills.

Fig. 34 *Re-purposed Oil Drum into Concert Hall*, animation still with drawing overlay.

An electric train, brimming with cassava crop, passes by an old oil drum, re-purposed into an amphitheater An electric train, brimming with cassava crop, passes by an old oil drum, re-purposed into an amphitheater.

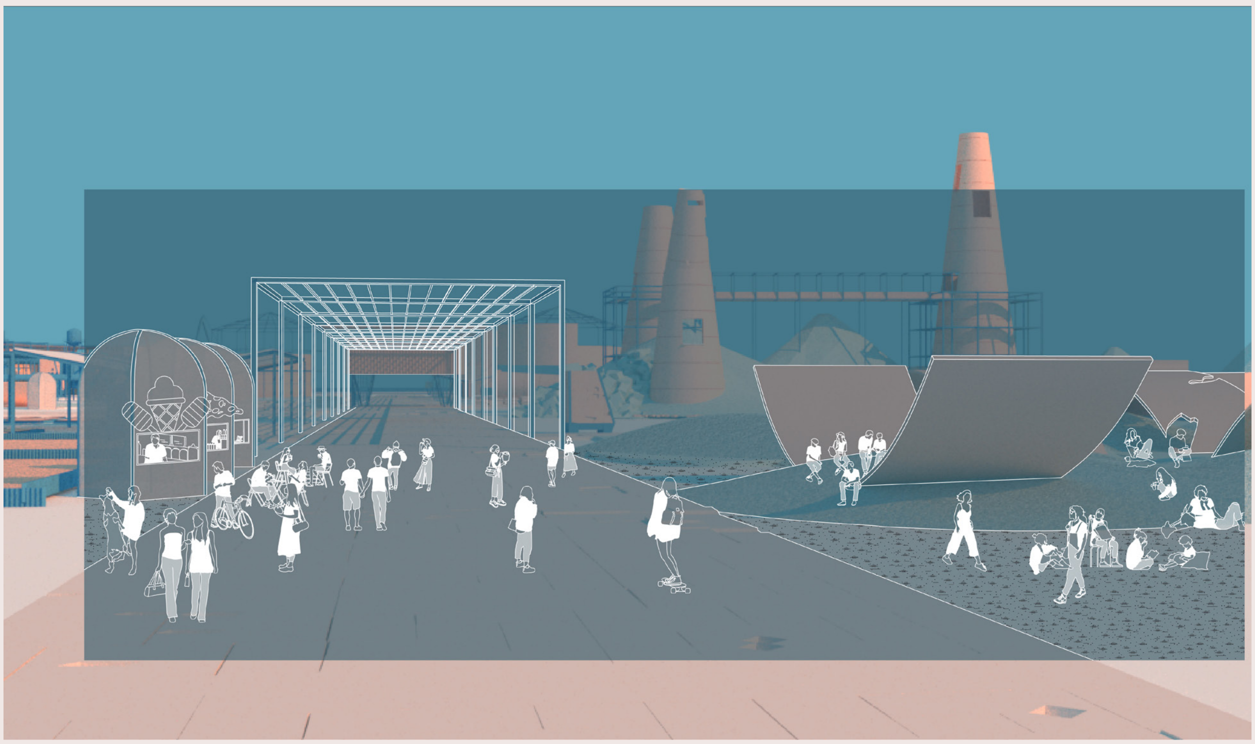


Fig. 35 *People Exploring New Landscape*, animation still with drawing overlay.

While these crops will be exported beyond the Bay, some are sold in pop-up market stalls that regularly appear along the pedestrian path.

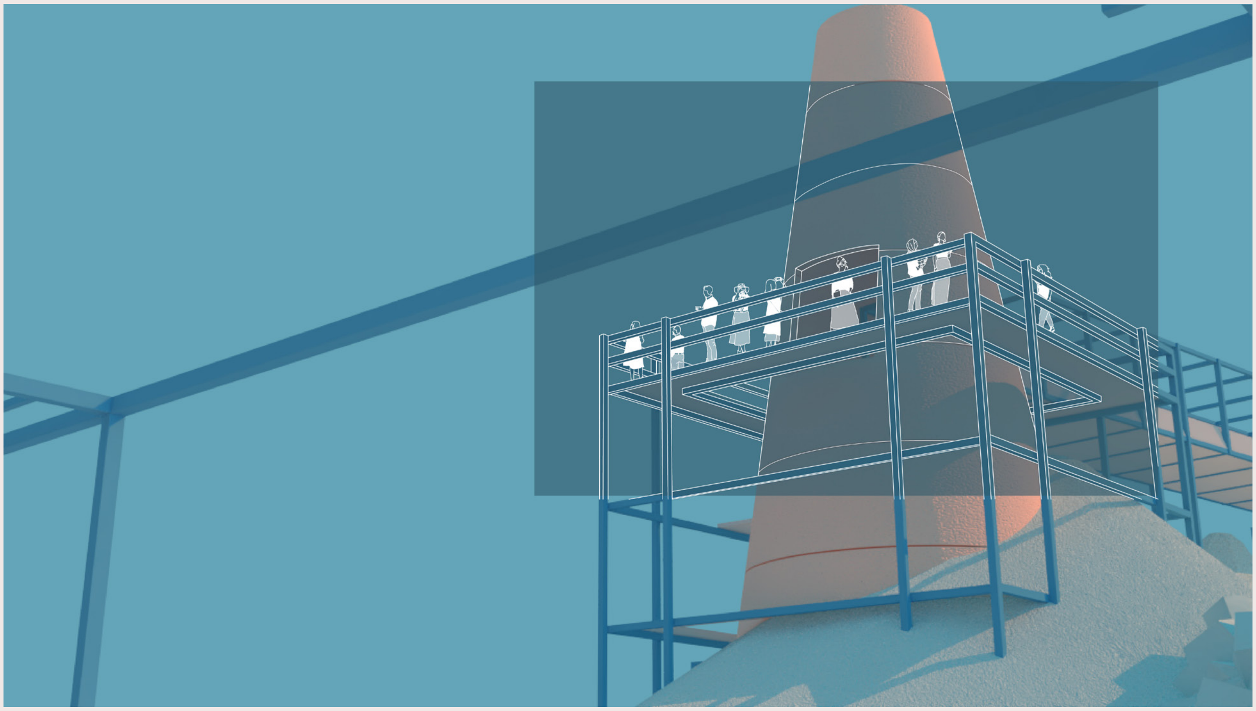


Fig. 36 *People Exploring New Landscape*, animation still with drawing overlay.

Fifteen meters above the path, residents watch the train pass by. Their observation deck is a re-purposed smokestack, reinforced with salvaged metal.

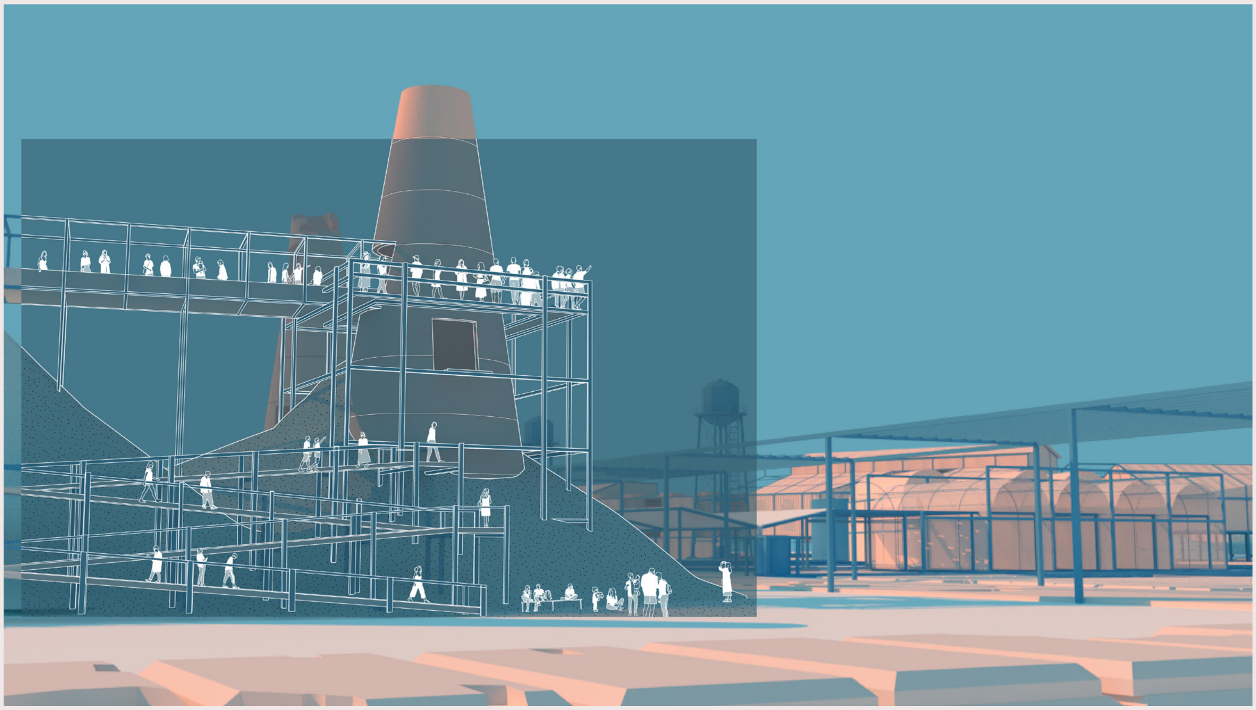


Fig. 37 *People Exploring New Landscape*, animation still with drawing overlay.

Nearby, neighbors erect a scaffold around another aging structure, an industrial beacon that is now a key node in a recreational network.

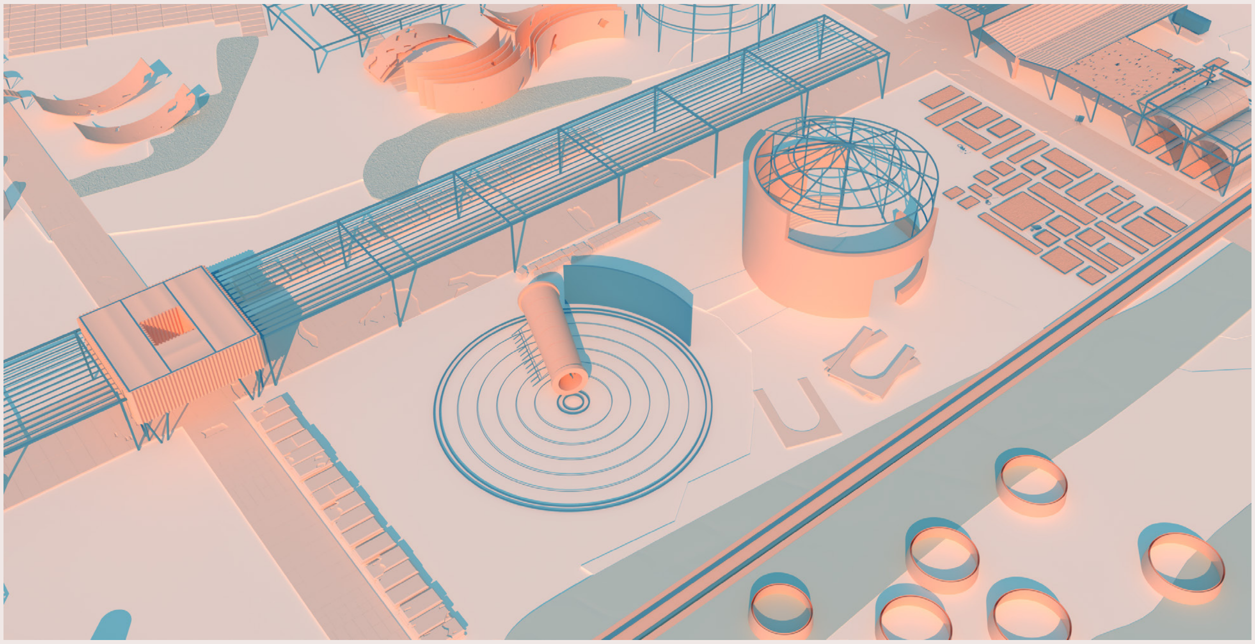


Fig. 38 *Re-purposed Chimney into Tilling Device*, animation still.

Deteriorating construction elements are re-purposed, rather than abandoned. When the scaffolding around them finally fails, these concrete cones are re-employed to till soil.

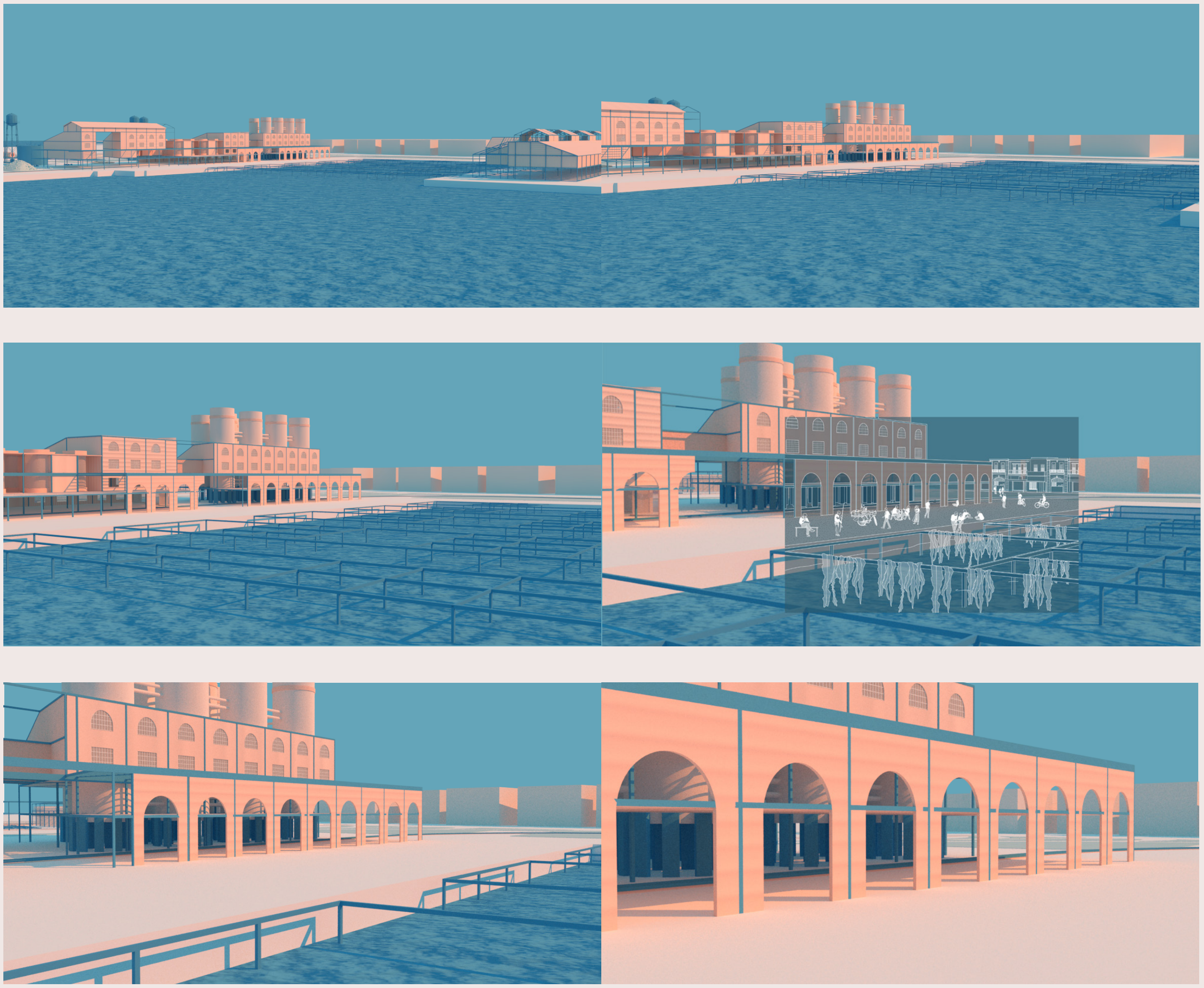


Fig. 39 *Introduction of Kelp Farm*, animation stills.

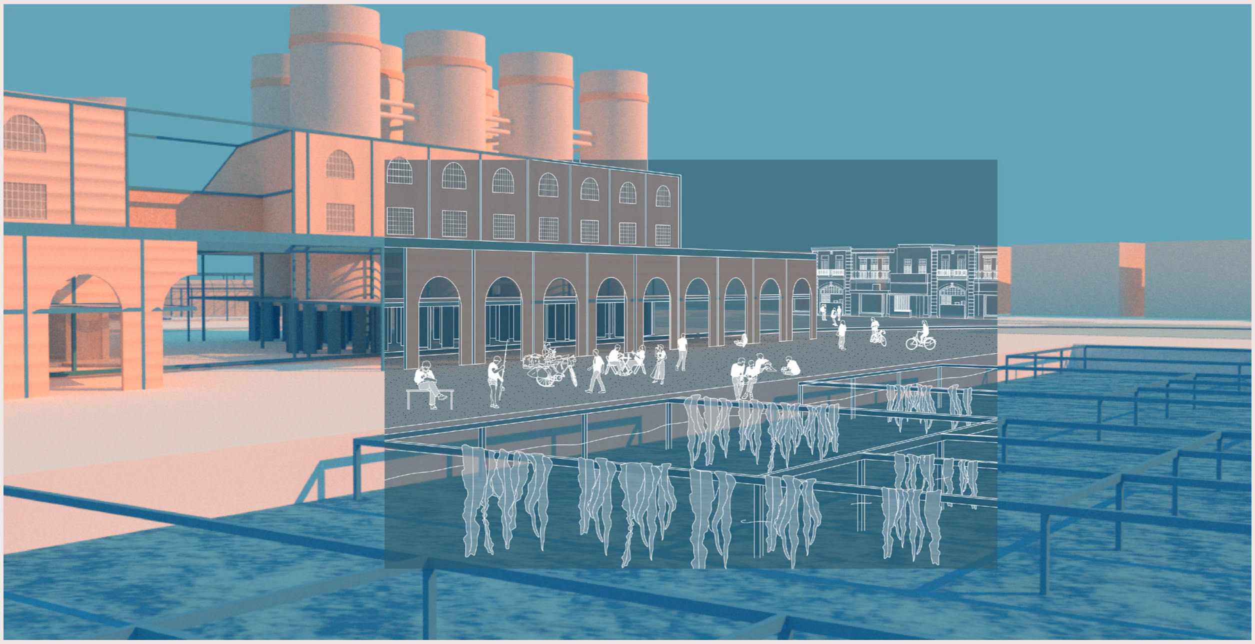


Fig. 40 *Kelp farm*, animation still with drawing overlay.

Residents also foster symbiosis through agriculture in the Bay's polluted waters, where an expanding kelp farm remediates its aquatic environment. The farm is a key study site for the expanding biogen facility, which sequences and analyzes the DNA of this marine ecosystem.

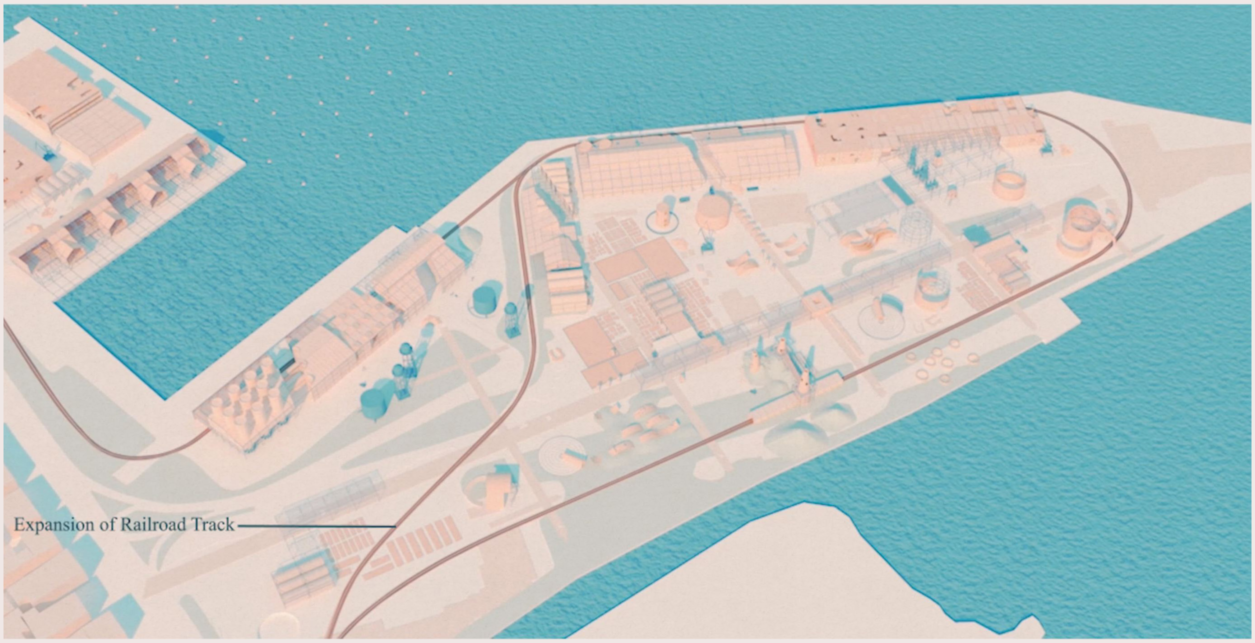


Fig. 41 *Ariel View of Phase IV*, animation still.

These moments mark a shift in Zone 1: from developing economic enterprises to expanding community projects, and from adapting existing elements to inventing new typologies. Community infrastructure and cleaner industries now present an opportunity for safe recreation in proximity to productivity.

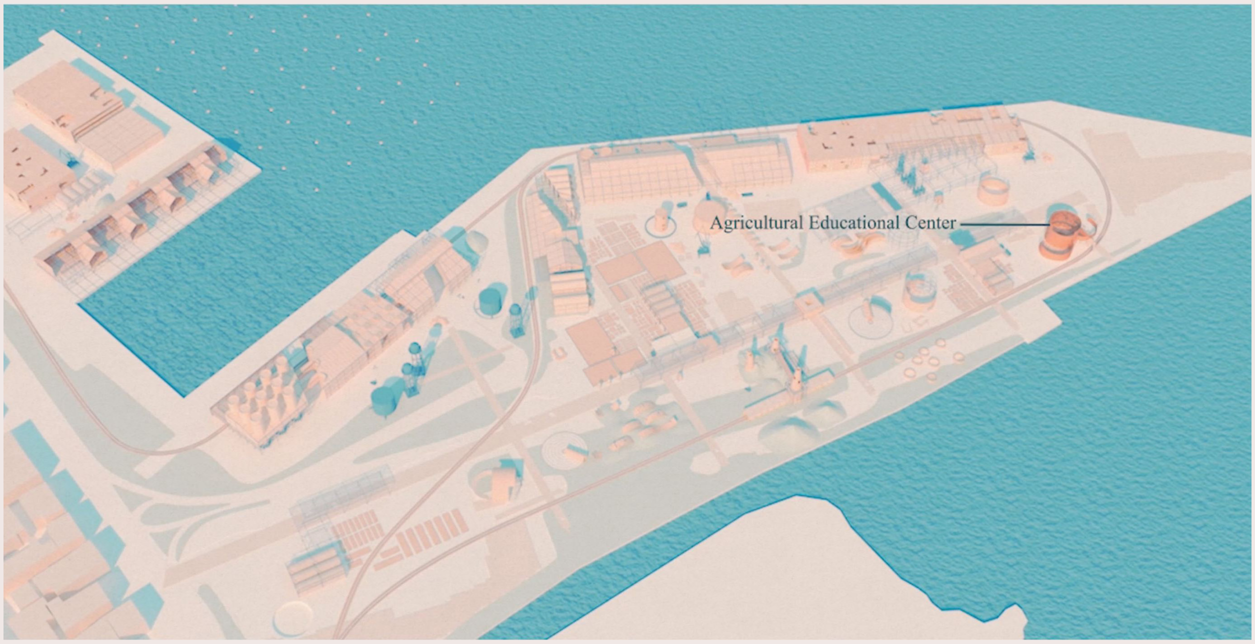


Fig. 42 *Ariel View of Phase IV*, animation still.

Fig. 43 *Ariel View of Phase IV*, animation still.

Part V: Yield

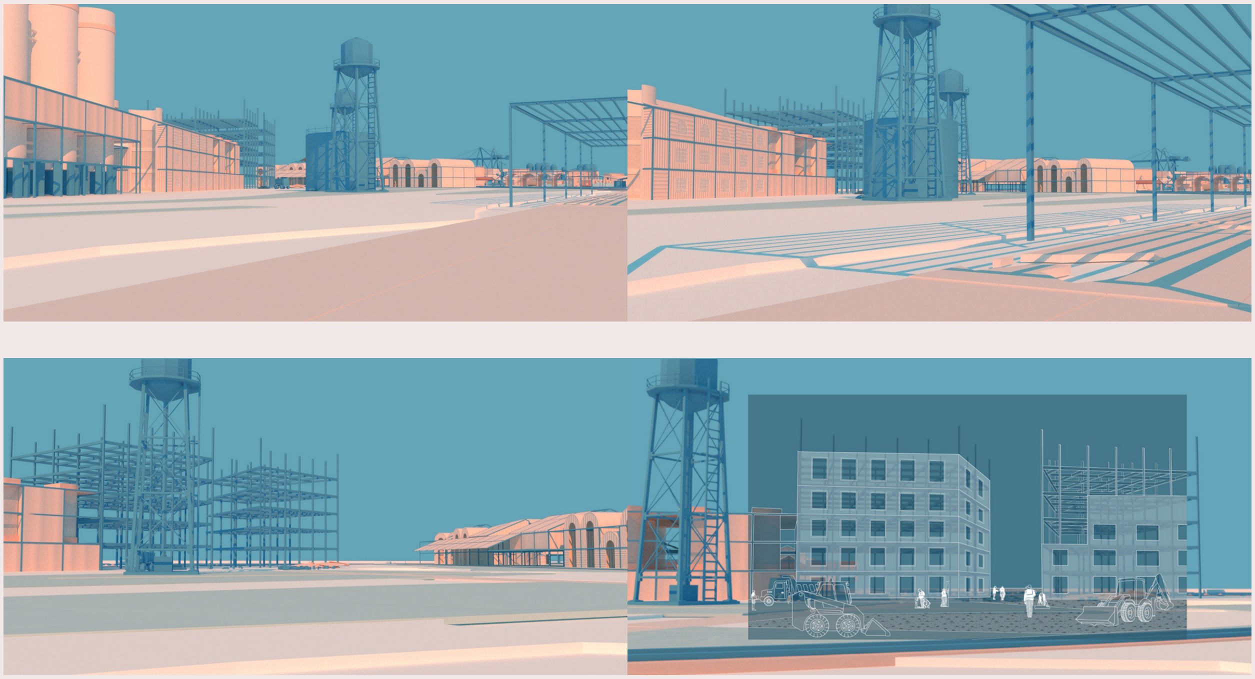


Fig. 44 *Construction of Normative Architecture*, animation stills.

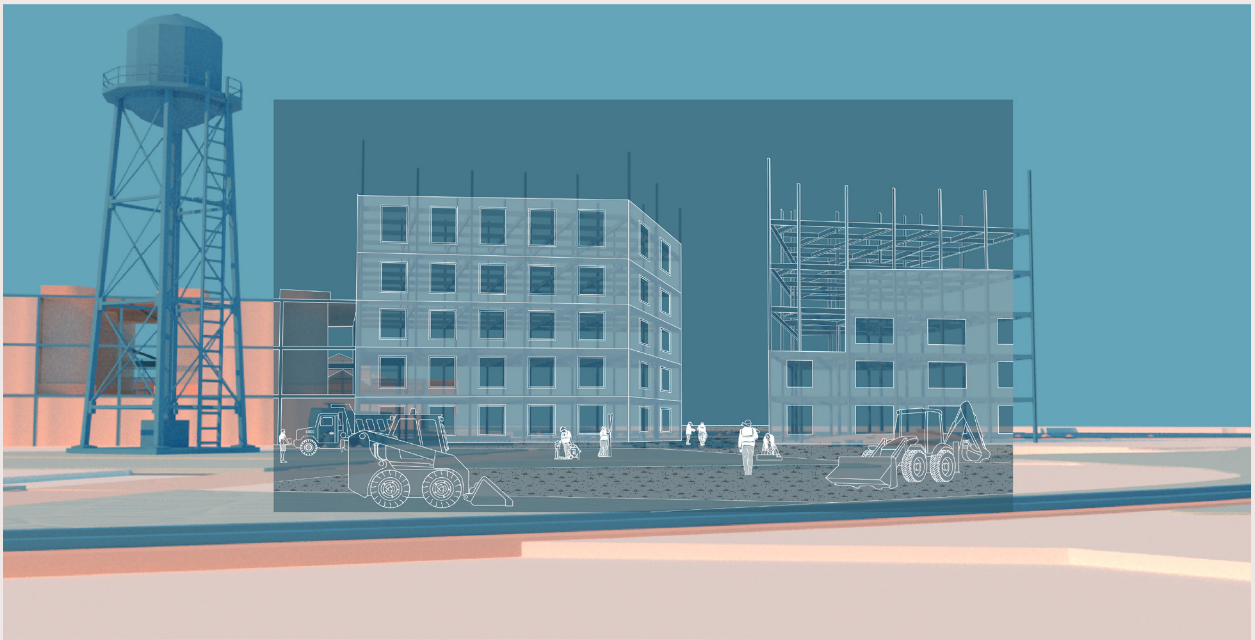


Fig. 45 *Construction of Normative Architecture*, animation still with drawing overlay.

The BioGen facility has expanded into a DNA data farm, where increasing global data storage demands are met. Here, binary data is sequenced into genetic material, and preserved for storage. 10^13 tetra-bytes of data is compressed into modules the size of a single cubic meter, the most efficient data storage system in the world.

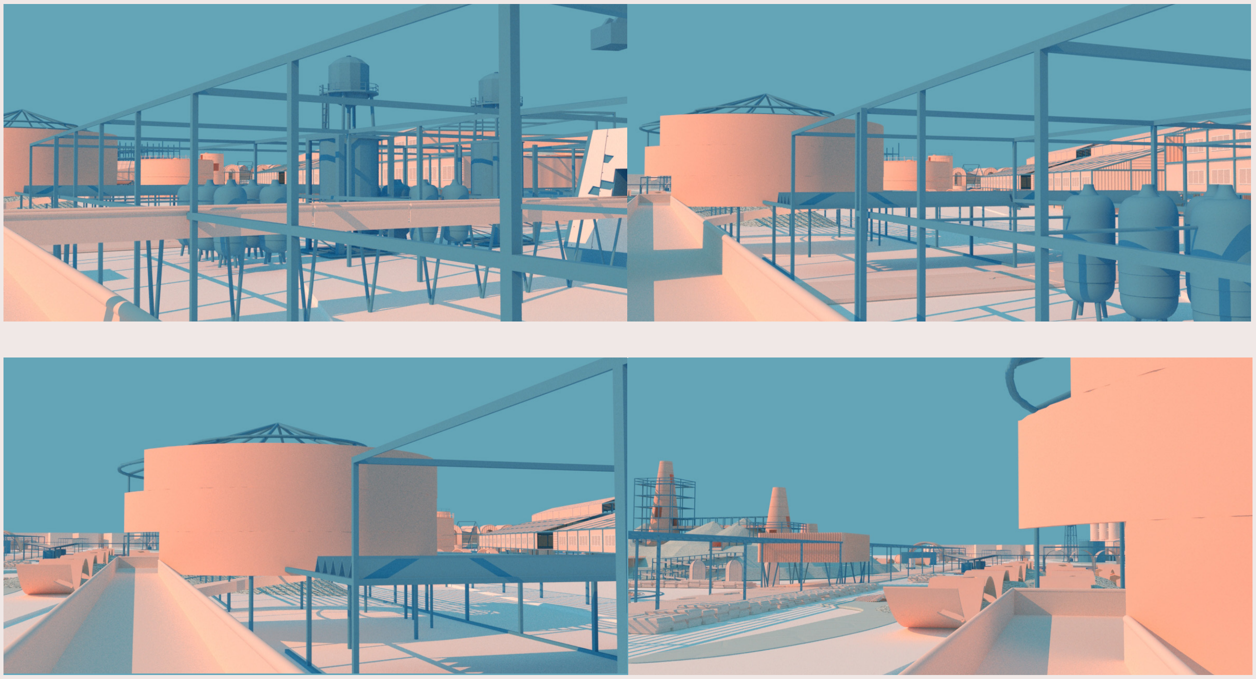


Fig. 46 *Crossing the Bridge*, animation stills.

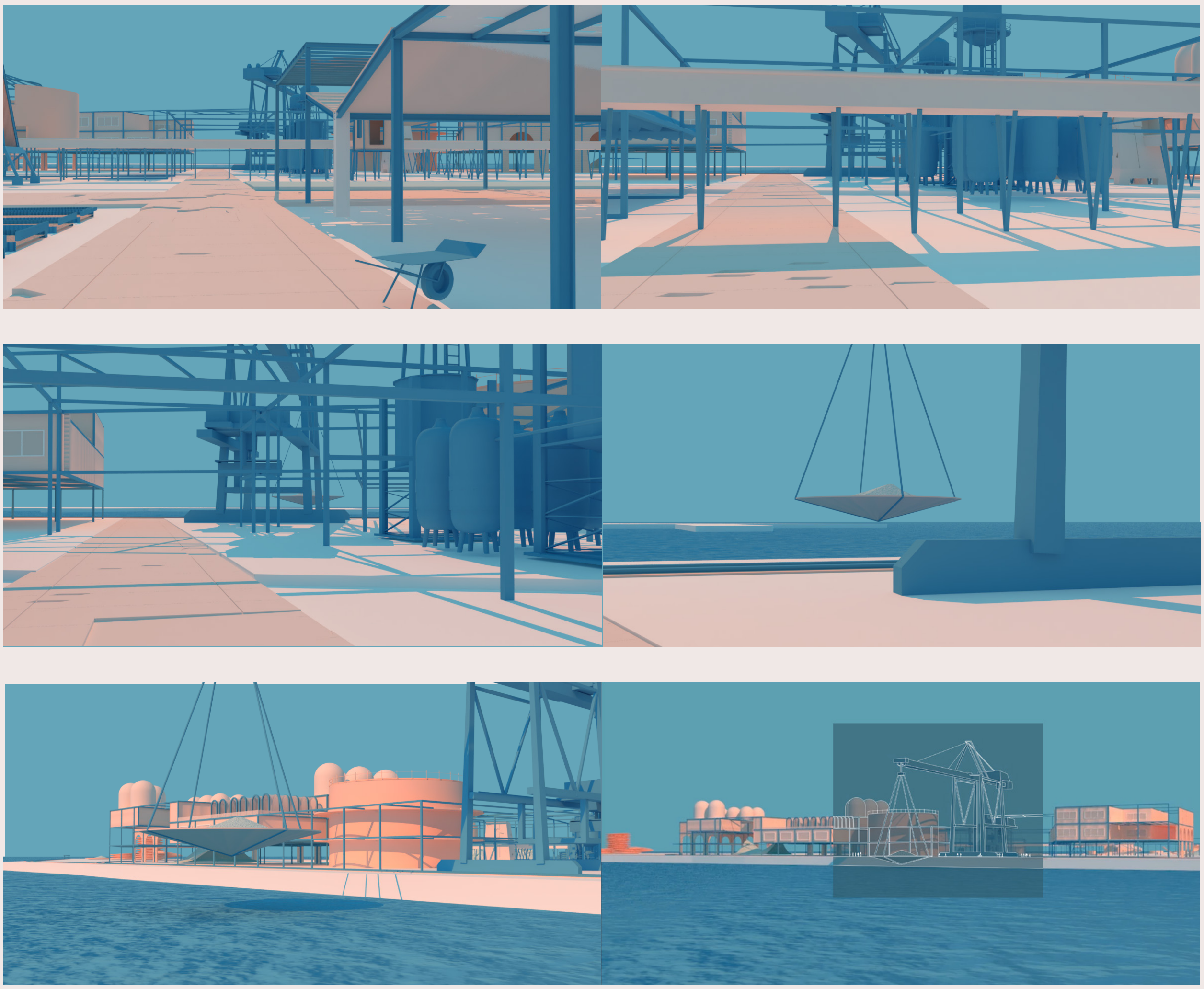


Fig. 47 *Bringing DNA Storage into the Bay (Underwater Storage),* animation stills.

Fig. 48 *Bringing DNA Storage into the Bay (Underwater Storage),* animation still with drawing overlay.

On the edge of the Bay, a crane grips a container from the BioGen facility. The machine lowers this innovative data system down 20 meters to the ocean floor, where it will be naturally cooled by deeper currents.

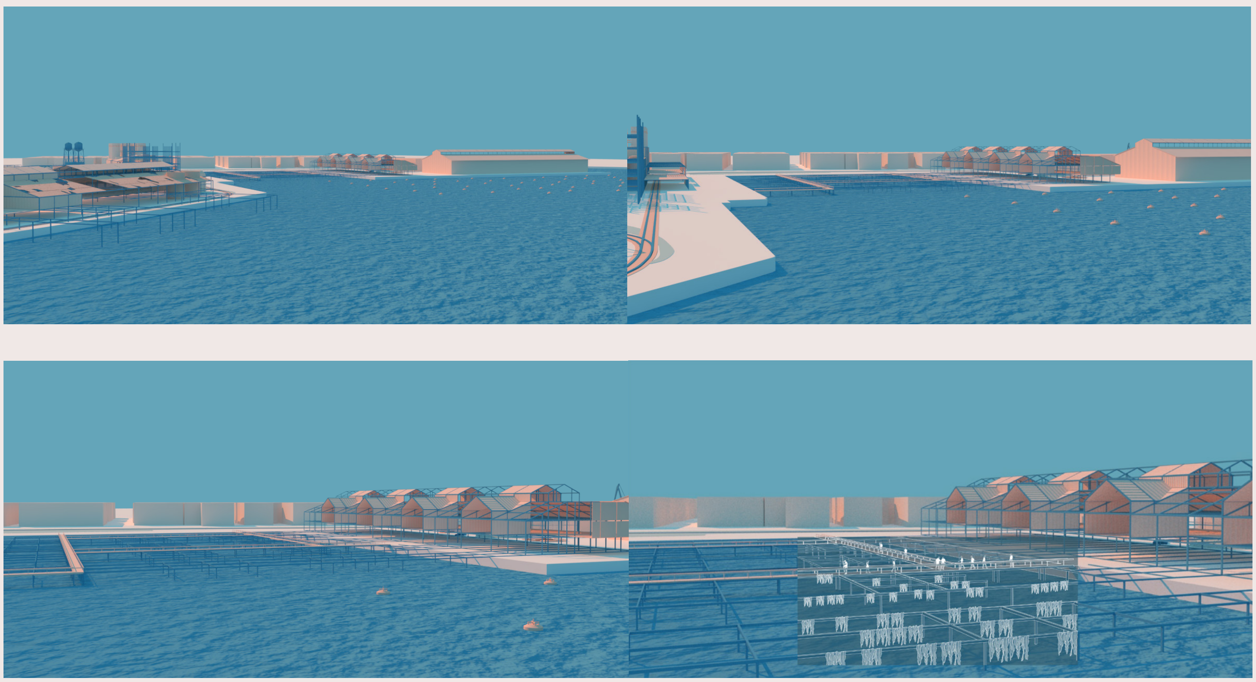


Fig. 49 *Kelp Farm Develops Pedestrian Walkways*, animation stills.

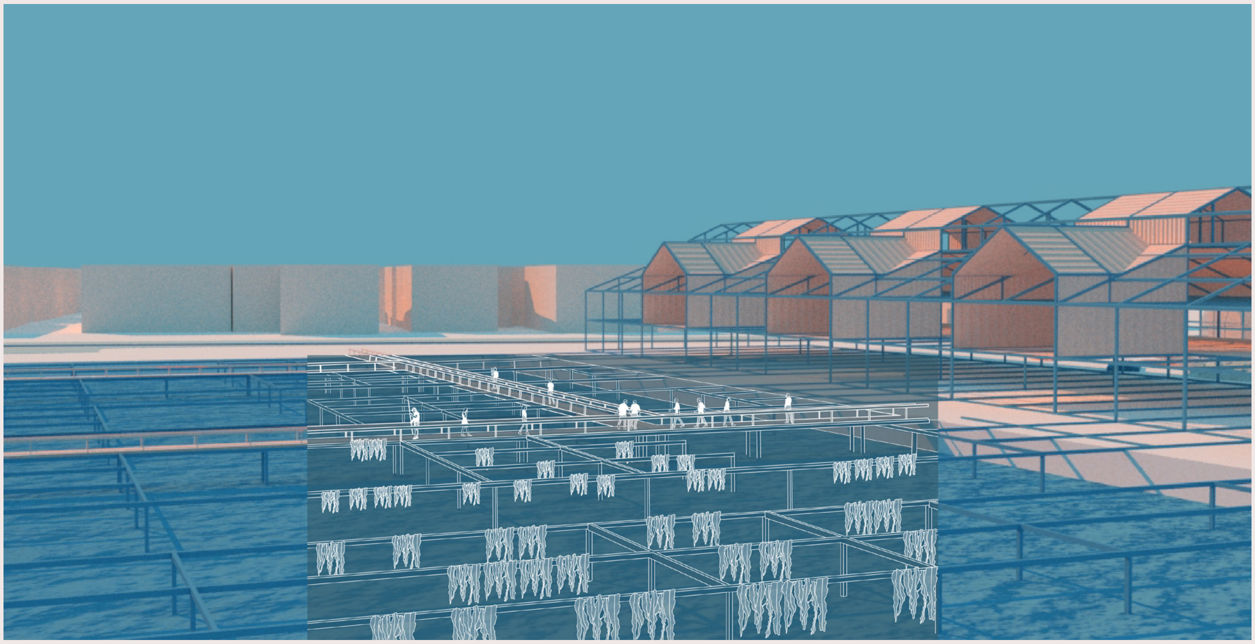


Fig. 50 *Kelp Farm Develops Pedestrian Walkways*, animation still with drawing overlay.

Above the surface of the water, a pedestrian network continues over the kelp farm, where citizens have developed community gardens and an agricultural education center.

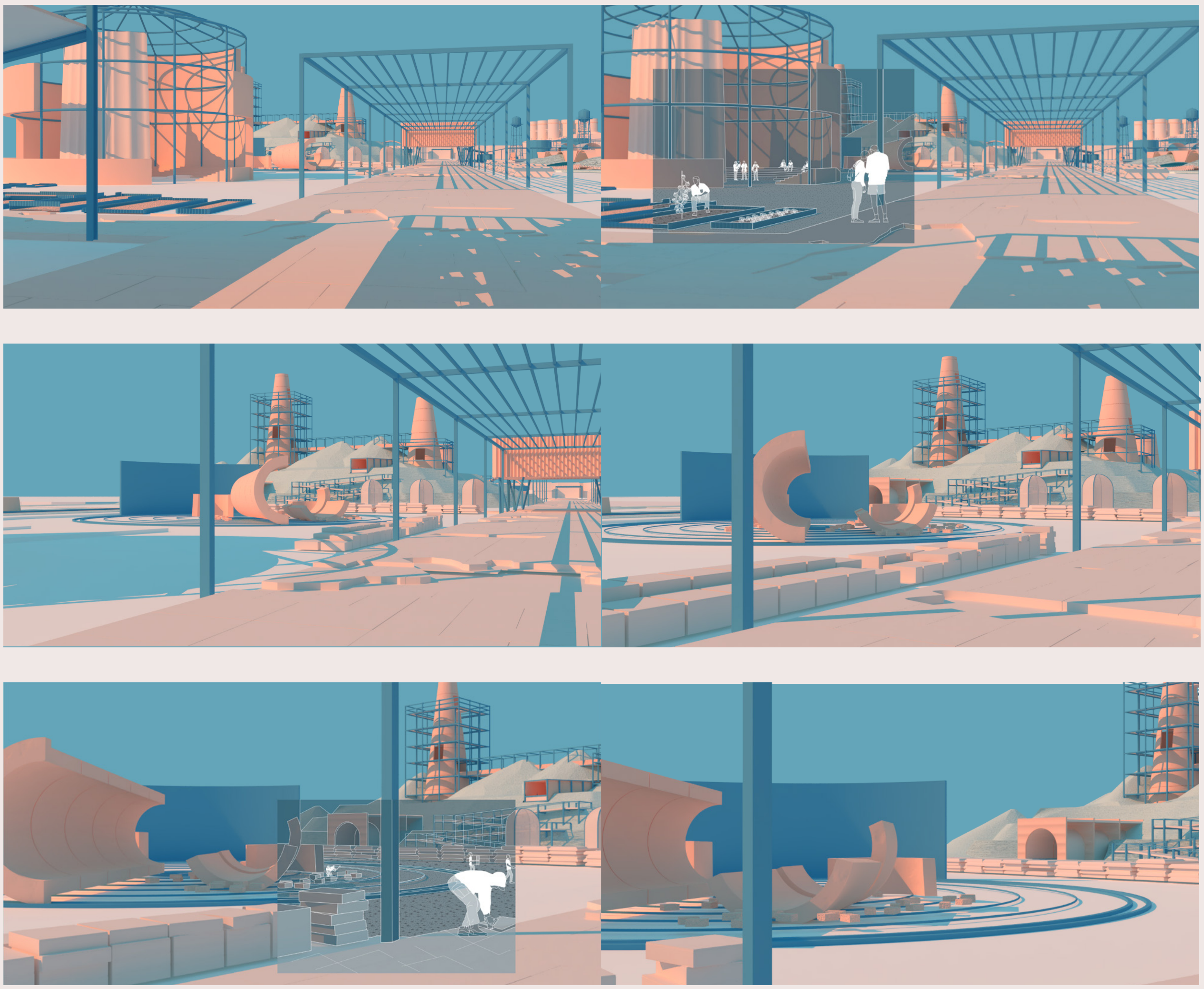


Fig. 51 *Recreation and Reuse*, animation stills.

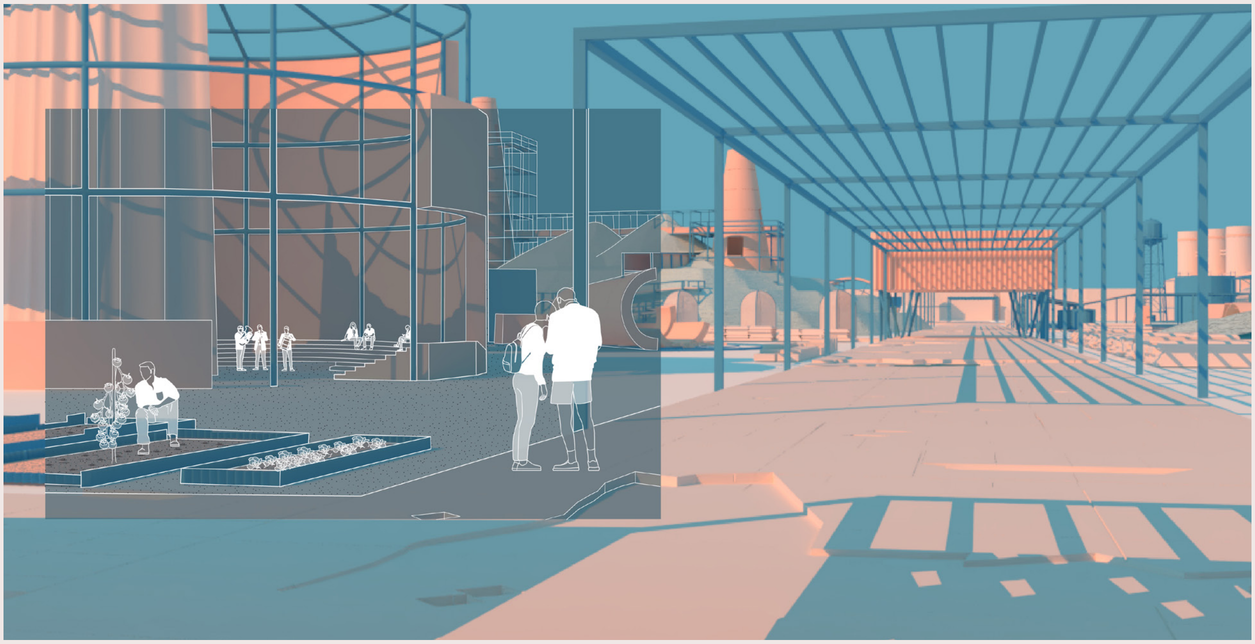


Fig. 52 *Recreation & New Forms of Growing*, animation still with drawing overlay.

Nearby, students occupy a re-purposed oil drum, designing remediation schemes for an adjacent zone at Punta Marti.

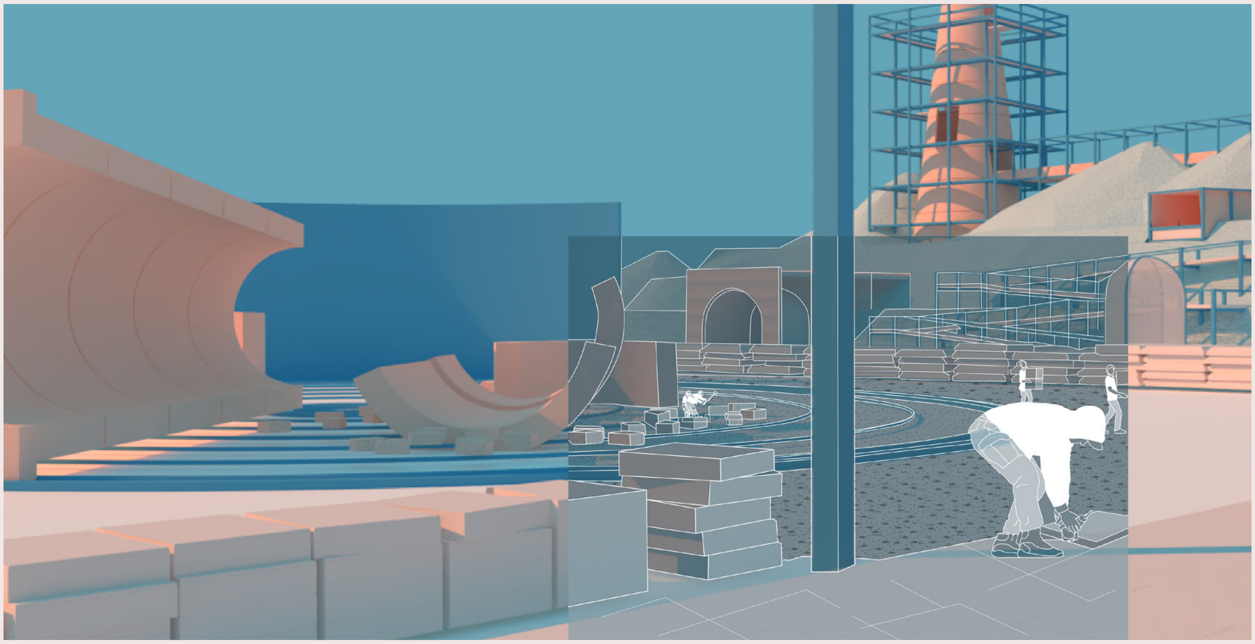


Fig. 53 *Reusing Bricks From Decaying Chimney to Fix Pedestrian Pathway* animation still with drawing overlay.

The collection and movement of materials on the site is always active. A broken silo, once re-envisioned as an agricultural instrument, is again re-used to fix the path.

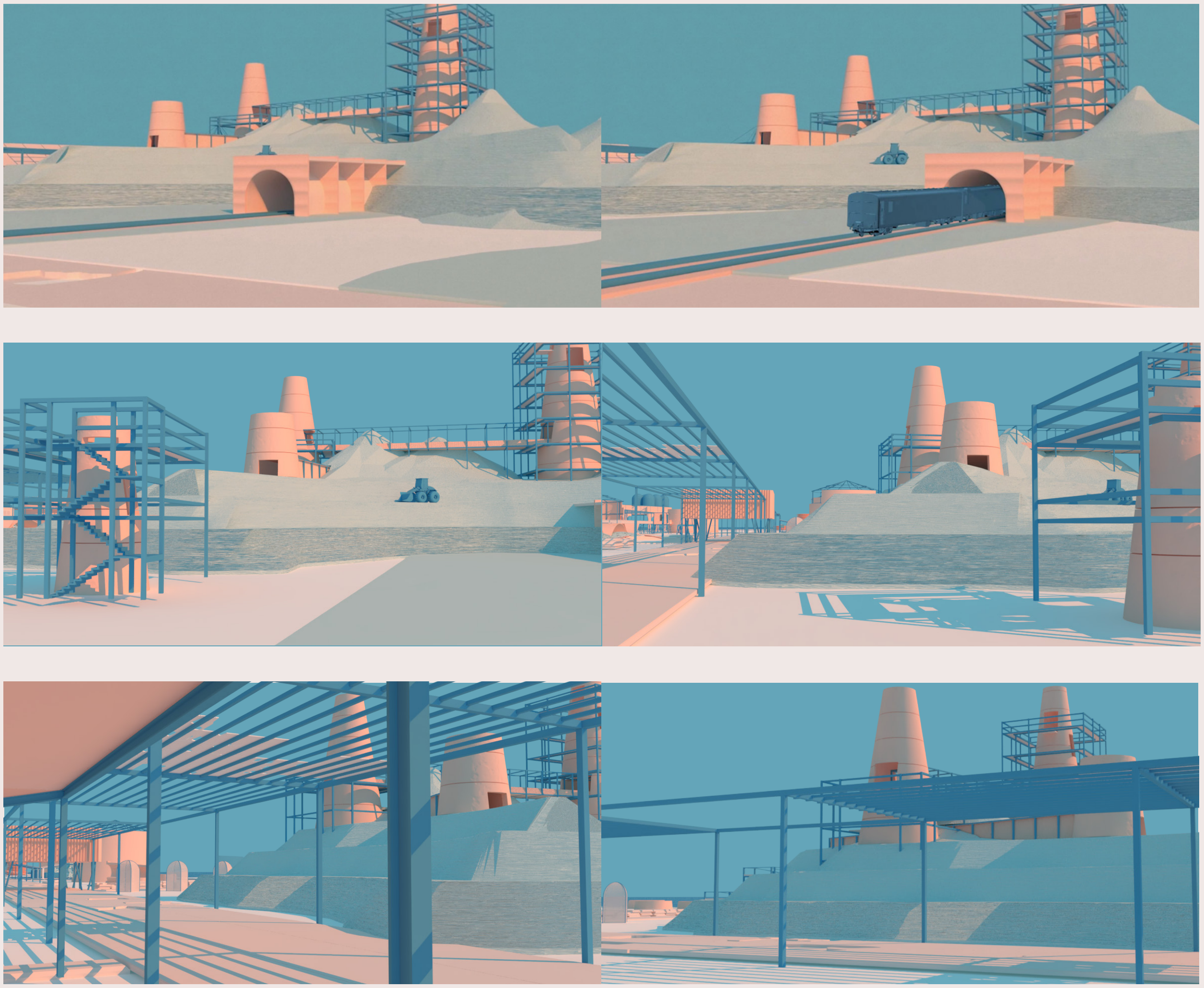


Fig. 54 *Recreational Landscape*, animation stills.

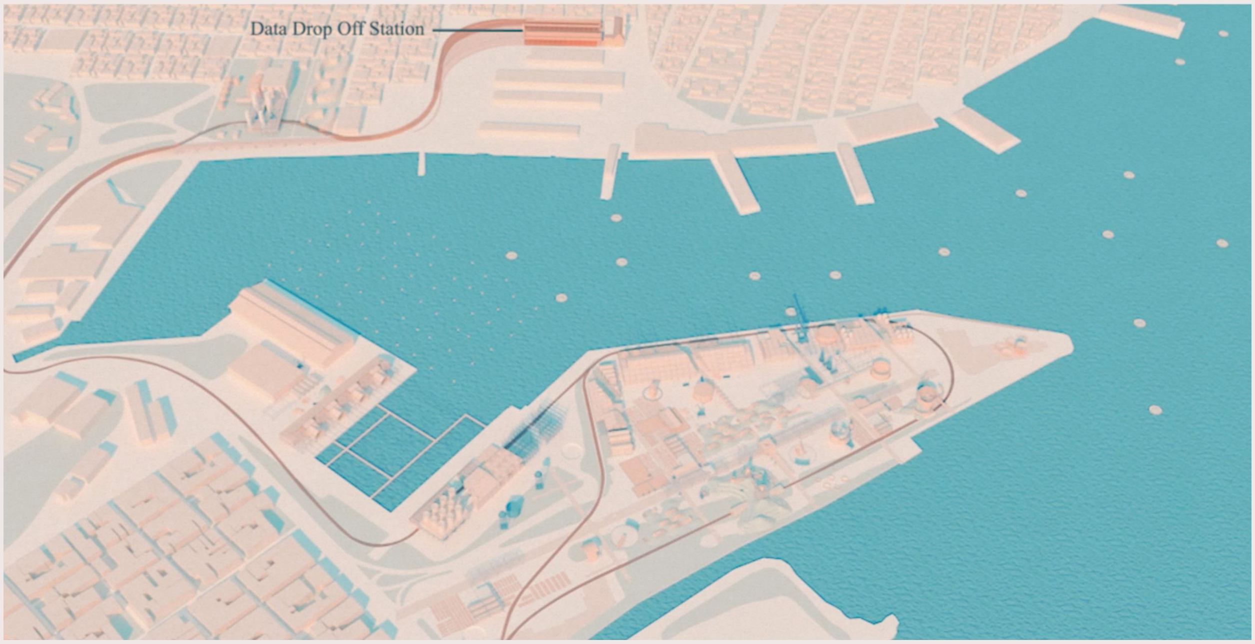


Fig. 55 *Ariel View of Phase V*, animation still.

These new systems of infrastructure and industry come together at the biobase. Research in recombinant DNA technology is integrated into urban agriculture, and expanded railways connect agricultural and technological materials within and beyond the original boundaries of the site.

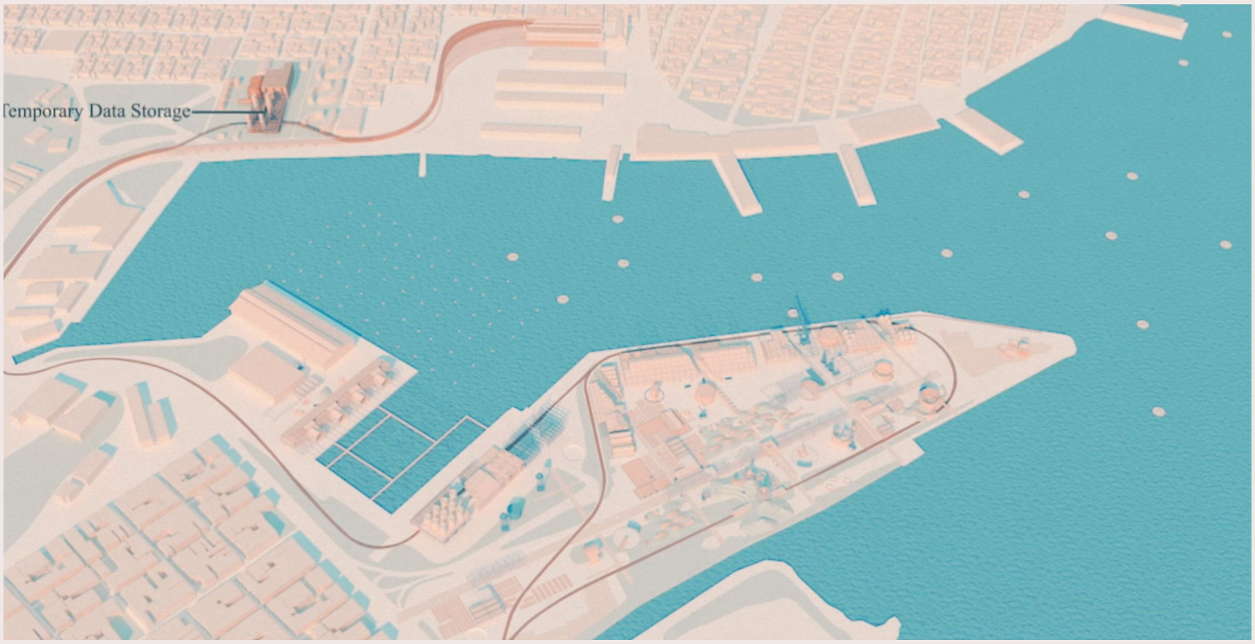


Fig. 56 *Ariel View of Phase V*, animation still.

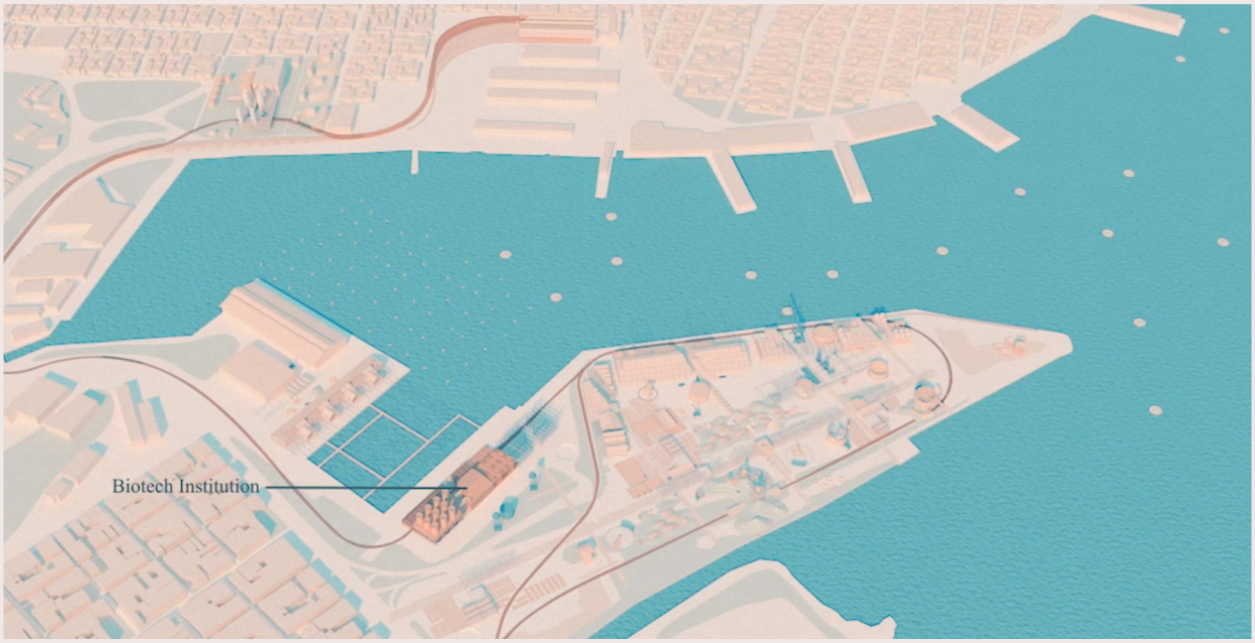


Fig. 57 *Ariel View of Phase V*, animation still.

Fig. 58 *Ariel View of Phase V*, animation still.

Fig. 59 *Ariel View of Phase V*, animation still.

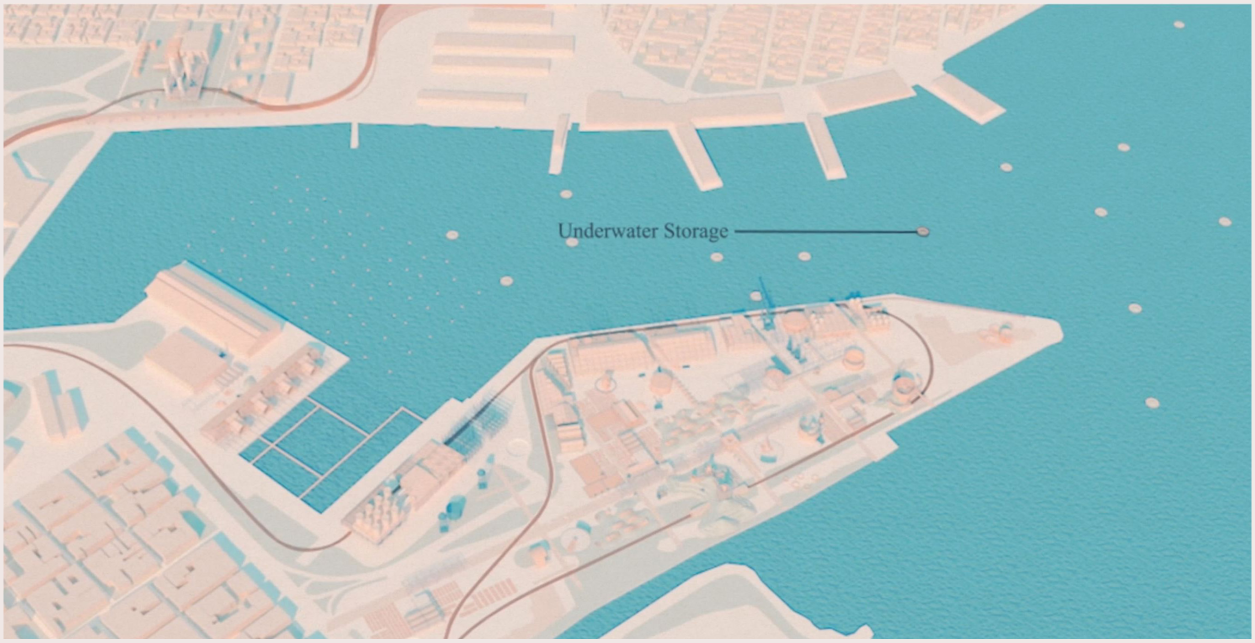


Fig. 60 *Ariel View of Phase V*, animation still.

Conclusion

Our project aims to challenge the global imaginary of Cuba, beyond the simplification of colonial heritage and a communist government. We establish the Bay of Havana as an incubator for key agricultural, recreational, and technological resources that are unique to the island. Over the course of four stages and several decades, these industries build capacity on site. The expanded railway opens access to the site and reconnects the Bay's isolated neighborhoods. Urban farming provides food security and local economy. Clean industries like the Biogen facility and the kelp farm encourage technological advancement and community engagement. The project accepts private investment as a necessary tool for expansion while fostering physical and political public connectivity.

The goal of this thesis is not developer intervention, but the development of new typology in the face of scarcity, one which leverages the unique economic context and the resilient culture of its citizens as tools of flexibility. Our involvement as designers expands beyond the boundaries of the building. We function not just as architects and planners, but as researchers, surveyors, and community organizers. We examine the complicated histories of land ownership, evaluate the materiality of existing equipment, and engage the Cuban ethos of resolver to activate the Bay.

We supplant existing models of development by centering the people and their processes, attempting to foster communal growth without inciting loss of culture. The project operates in the hyper local, rather than the global generic. But our site lives in a state of perpetual flux, constantly adapting within a gradient of ruin, rebuilding, and new construction. Eventually, this continuing development begins to result in more normative architectures on site, and paradoxically, the Bay begins to reflect the economic systems which it was initially forced to subvert. The site is caught in the oscillations between global and local, capital and communal. Operating during one such turn of speculative foreign investment, this thesis provides a future where the Bay of Havana is reclaimed by its people, if only for a moment.

Model

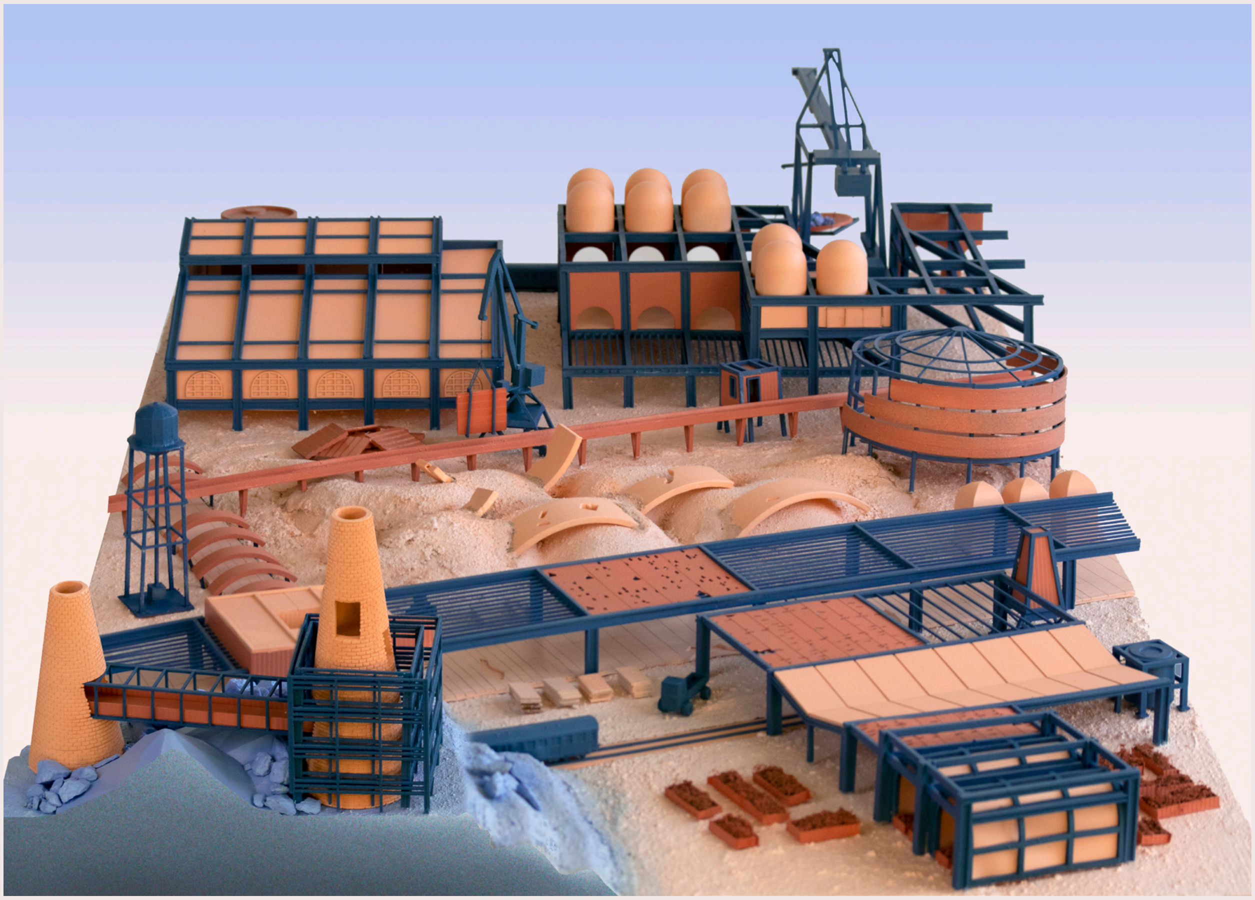


Fig. 61 *Overall View*, photograph of scale model 1:100.

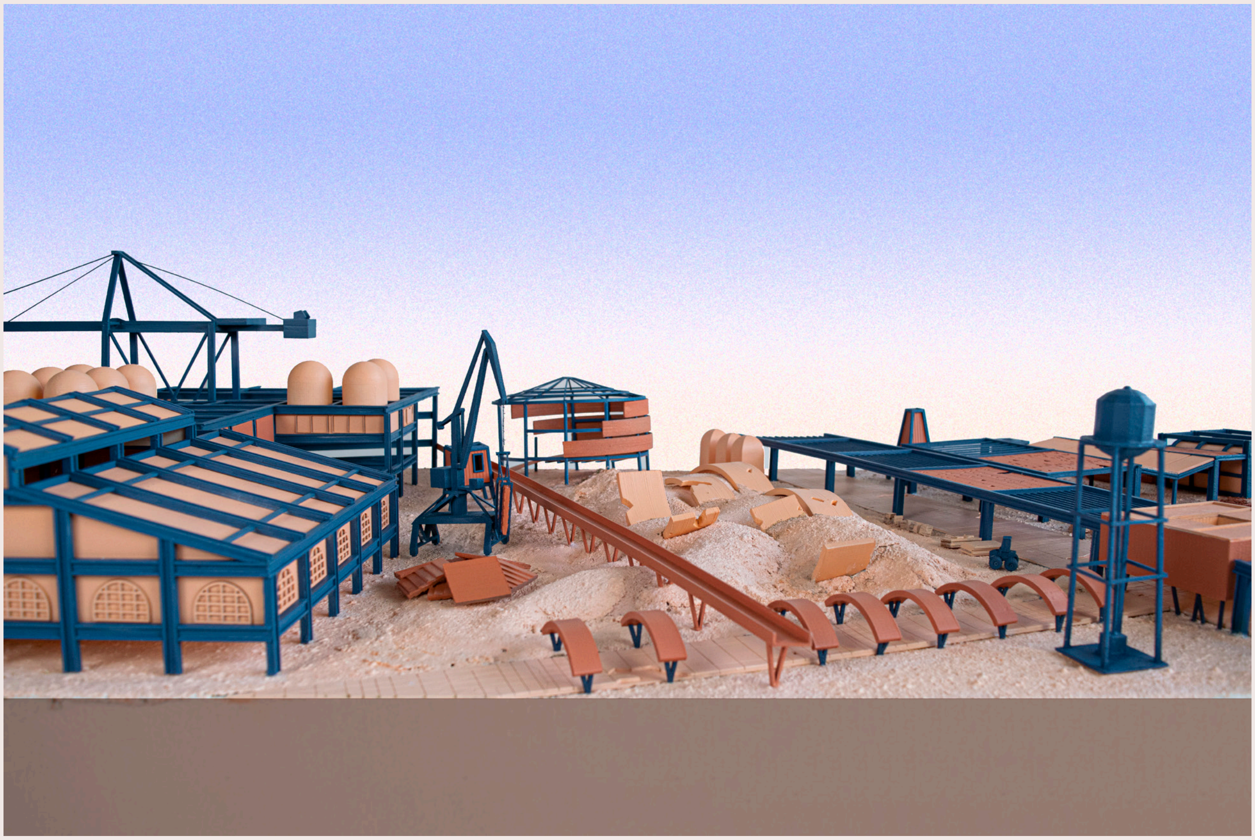


Fig. 62 *Section View*, photograph of scale model 1:100.

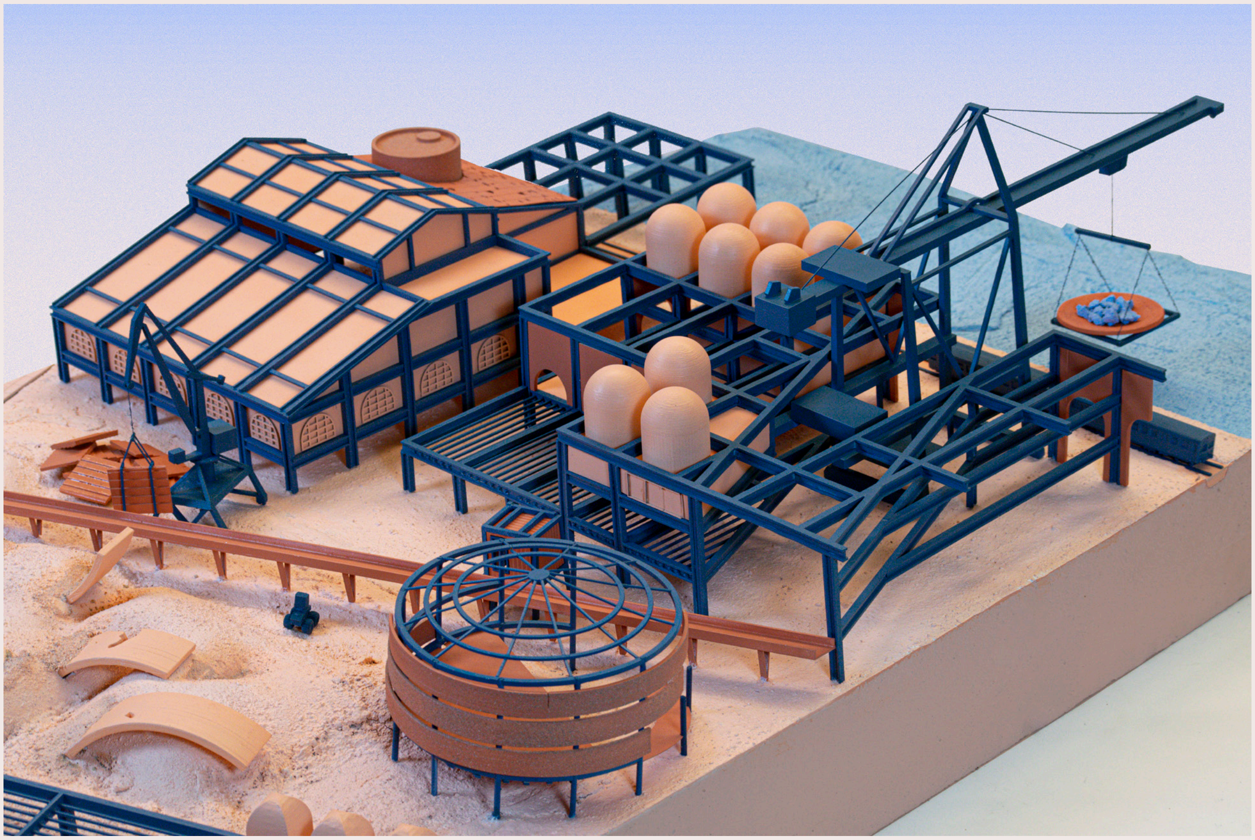


Fig. 63 *View of Labs*, photograph of scale model 1:100.

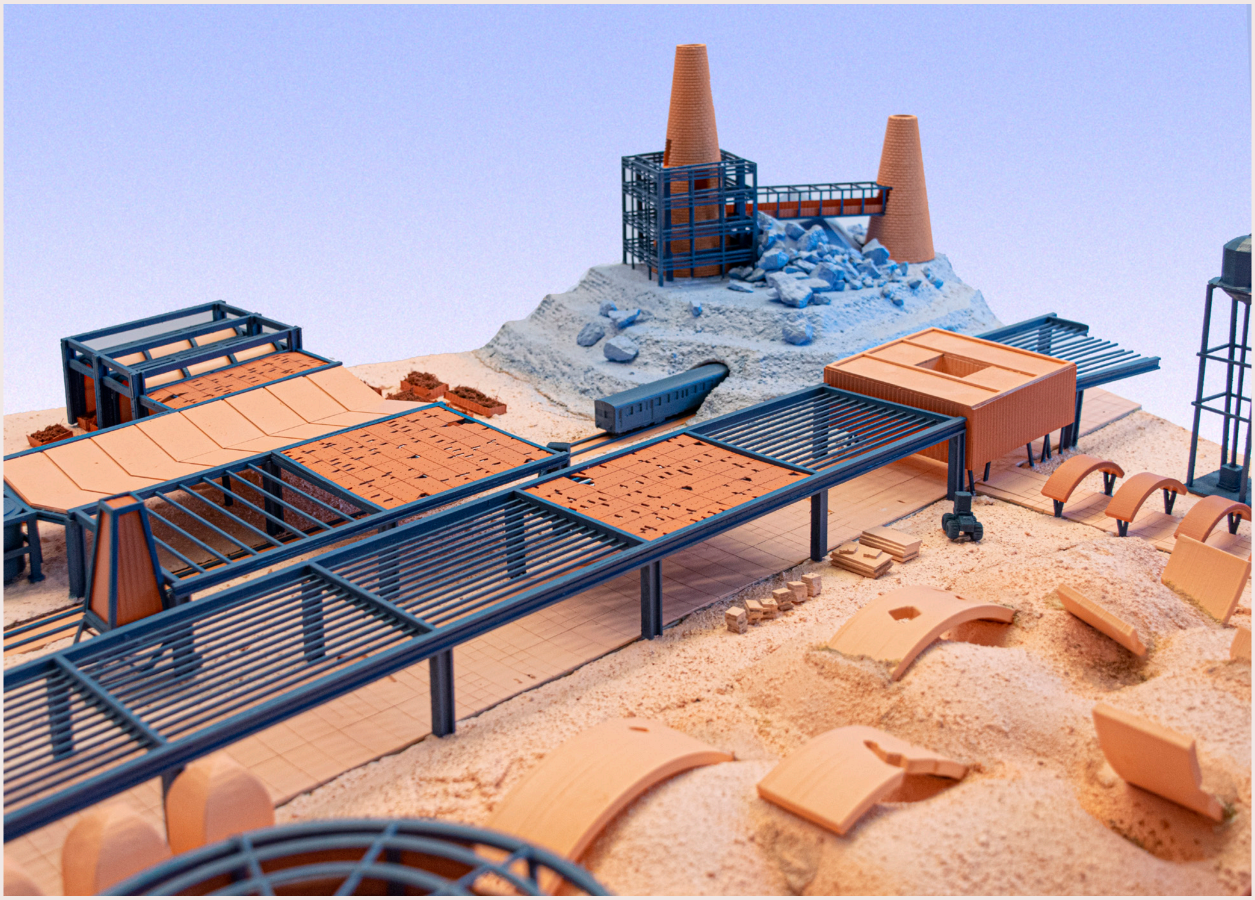


Fig. 64 *View of Landscape*, photograph of scale model 1:100.

Fig. 65 *Detail of Landscape Transformation*, photograph of scale model 1:100.

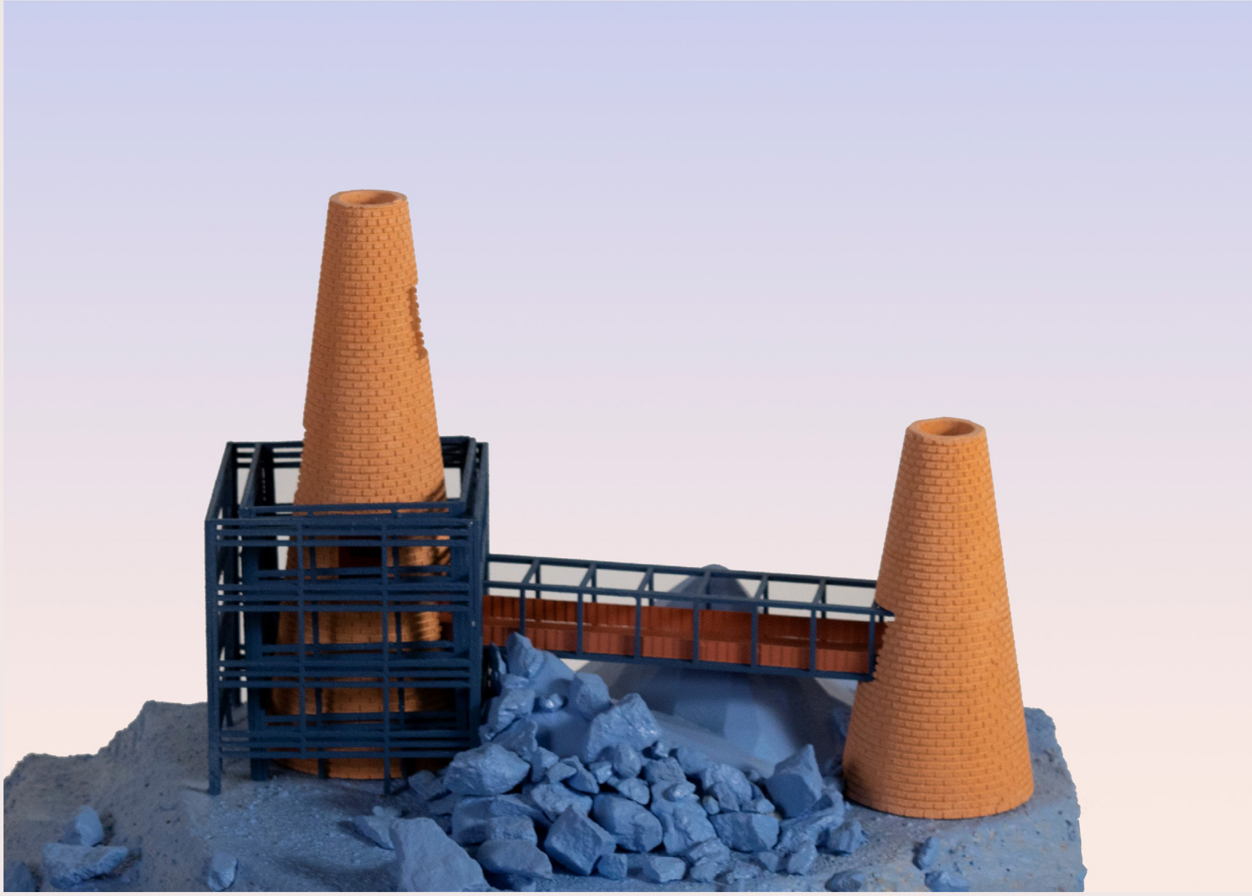


Fig. 66 *Detail of Chimney Playground,* photograph of scale model 1:100.

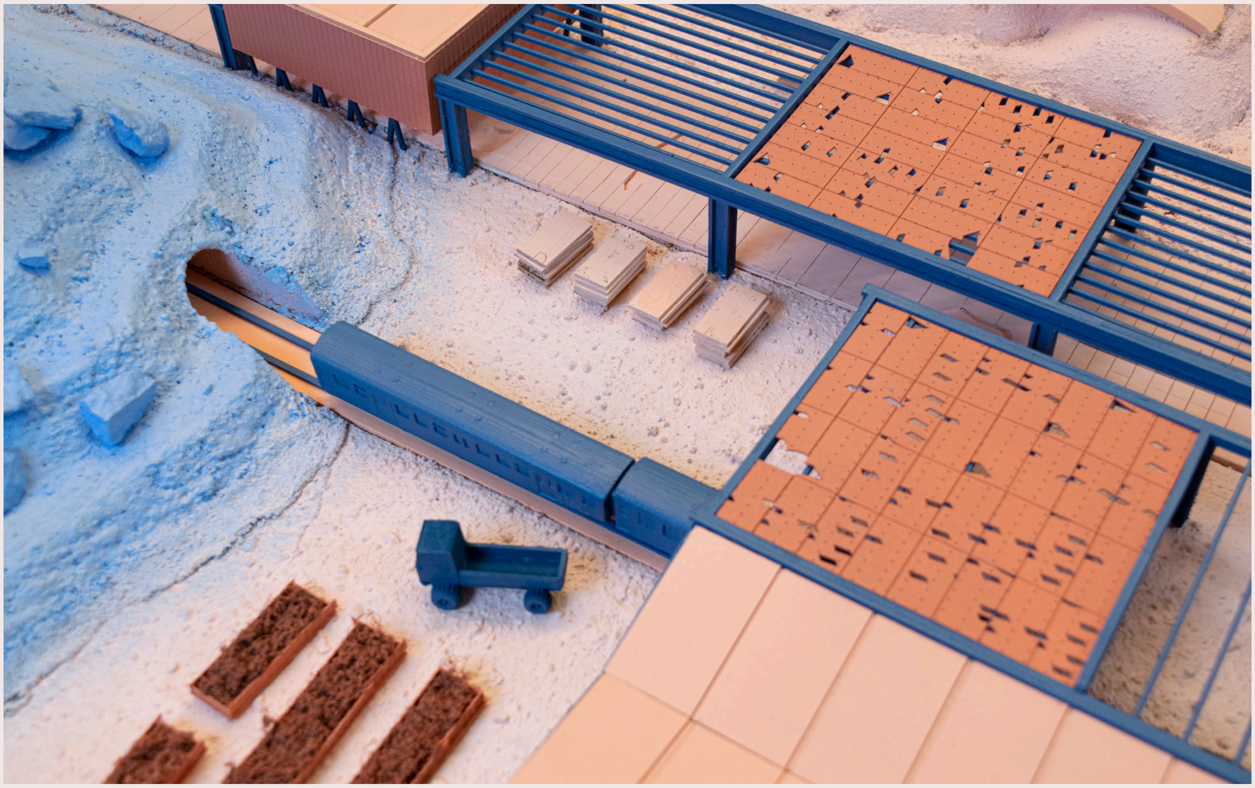


Fig. 67 *Detail of Urban Farming and Train*, photograph of scale model 1:100.

Conectividad Alegal

(Building Capacity)

(Building Community)

https://youtu.be/QiEitd8FBB4?t=495

Pre-Thesis Research

informal networks of commodity exchange

networks of human and non-human agents

spatial infrastructure that facilitate the production,
distribution and security of commodities

Fig. 68 *El Paquete Semanal*, photograph with drawing overlay, 2017.

In Cuba, TV Channels beyond the few state-run channels are prohibited, and publications are limited to the state-approved newspapers and magazines. The craving for inaccessible media mutated and led to the creation of a vast underground network of entertainment and news media known as El Paquete Semanal (The weekly package). This trove of digital content possesses a diverse array of media formats, including movies, YouTube videos, iPhone apps and PDFs of Spanish newspapers. This assortment is gathered, organized and transferred through a human network of runners and dealers reaching consumers all over the country. El paquete relies on data traffickers to deliver the files which are obtained by either being brought physically onto the island by incomers from Miami, or digitally via illegal satellites that are hidden in water tanks on rooftops.

Fig. 69 *Informal Local Network Lines*, photograph with drawing overlay, 2017.

The development of Cuba's internet infrastructure was greatly affected by the tightening of US embargo sanctions. Although recent progress in the field has been made, allowing people to connect to the web, slow internet speeds and high service prices have engendered the creation of alternative networks of connectivity. Street Network, or SNET, began by spreading long ethernet cables across rooftops of Havana, connecting several computers so people wouldn't have to carry their desktop machines to play StarCraft or Counter-Strike. Informal connection started spreading by adding more cables, routers, and handmade antennas, connecting several small networks into a city-spanning infrastructure that could be administered loosely. This alegal approach to connectivity transformed the means of information sharing on the island, inviting new users into a digital realm of knowledge and cultural activity whose intensity was all the more remarkable given the system's elaborate framework. Expanding inwardly, SNET users began creating websites criollas or clones of well-known online destinations. Following SNET strict rules, none of the site administrators were allowed to display advertisements or charge users to access their sites. These creations were made with the same principles in mind as the SNETs early stages: to explore new methods of communal sharing and participation in an alternative digital realm.

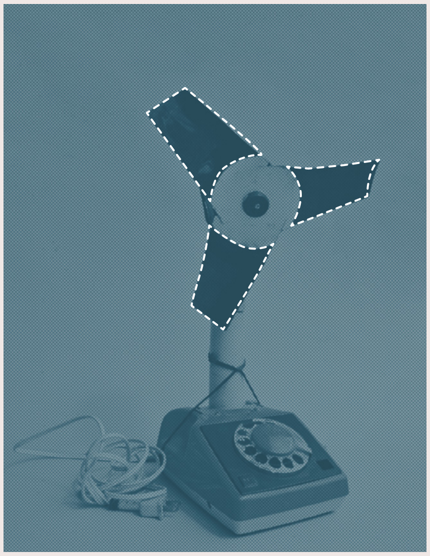
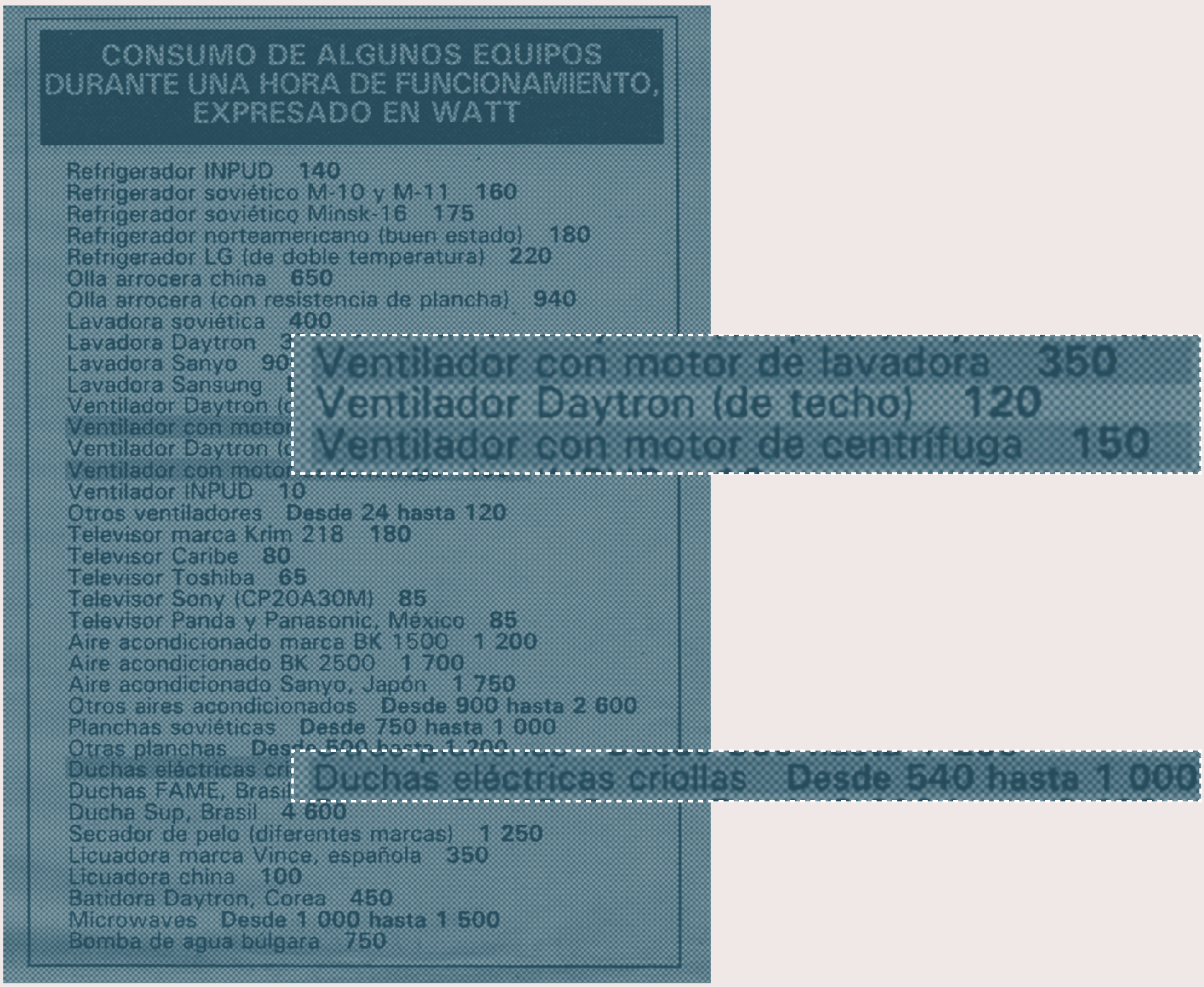
 

Fig. 70 *Objects of Resolver*, photographs with drawing overlay, 2017.

A fundamental shift in material culture and in how people perceived objects began to emerge in Cuba during this period. Commodities were pulled apart and reconfigured into purposeful forms: aluminum dinner trays were hoisted onto poles to repair broken antennas, discarded cans became vessels for kerosene lamps and vinyl records were cut into replacement blades for fans. These individual hallmarks of creativity were passed on through word of mouth, spurring entirely new production and consumption models based on community and discourse. Thus, new networks emerged that were predicated on communal care – distributing information and technology both informally and formally after a period of germination catalyzed by the Revolutionary Armed Forces.


CONSUMO DE ALGUNOS EQUIPOS DURANTE UNA HORA DE FUNCIONAMIENTO, EXPRESADO EN WATT

Refrigerador INPUD 140
Refrigerador soviético M-10 y M-11 160
Refrigerador soviético Minsk-16 175
Refrigerador norteamericano (buen estado) 180
Refrigerador LG (de doble temperatura) 220
Olla arrocera china 650
Olla arrocera (con resistencia de plancha) 940
Lavadora soviética 400
Lavadora Daytron 3
Lavadora Sanyo 90
Lavadora Sansung
Ventilador Daytron (
Ventilador con motor
Ventilador Daytron (
Ventilador con motor
Ventilador INPUD 10
Otros ventiladores Desde 24 hasta 120
Televisor marca Krim 218 180
Televisor Caribe 80
Televisor Toshiba 65
Televisor Sony (CP20A30M) 85
Televisor Panda y Panasonic, México 85
Aire acondicionado marca BK 1500 1 200
Aire acondicionado BK 2500 1 700
Aire acondicionado Sanyo, Japón 1 750
Otros aires acondicionados Desde 900 hasta 2 600
Planchas soviéticas Desde 750 hasta 1 000
Otras planchas Desde 500 hasta 1 200
Duchas eléctricas cri
Duchas FAME, Brasil
Ducha Sup, Brasil 4 600
Secador de pelo (diferentes marcas) 1 250
Licuadora marca Vince, española 350
Licuadora china 100
Batidora Daytron, Corea 450
Microwaves Desde 1 000 hasta 1 500
Bomba de agua búlgara 750

Ventilador con motor de lavadora 350
Ventilador Daytron (de techo) 120
Ventilador con motor de centrífuga 150

Duchas eléctricas criollas Desde 540 hasta 1 000

Fig. 71 *Trabajadores Newspaper*, photograph with drawing overlay, 2019.

The newspaper “Trabajadores” published in 2005 a list of appliances and their electric consumption per hour. In this list, we can see included the “Fan with a washing machine engine” and “Fan with a dryer engine”. In both of these cases, they are referencing fans fabricated with engines by the Soviet washing machine company Aurika. Another interesting artifact in this list is the “Electric Shower Head Criolla.”

Fig. 72 *Washing Machine to Food Processor*, photograph with drawing overlay, 2012.

In the case of the Soviet Aurika 70 washing machine, it came with a washing machine and a drying machine. Given the climate on the island, the mechanical drying could be done away with. Many individuals used the motor from the dryer for other purposes. This was the real motor of the revolution: there was no sector of life in which this object was not being reused in some way. I have records of its presence in dozens of artifacts including lawn mowers, key-cutters, vegetable cutters and fans.

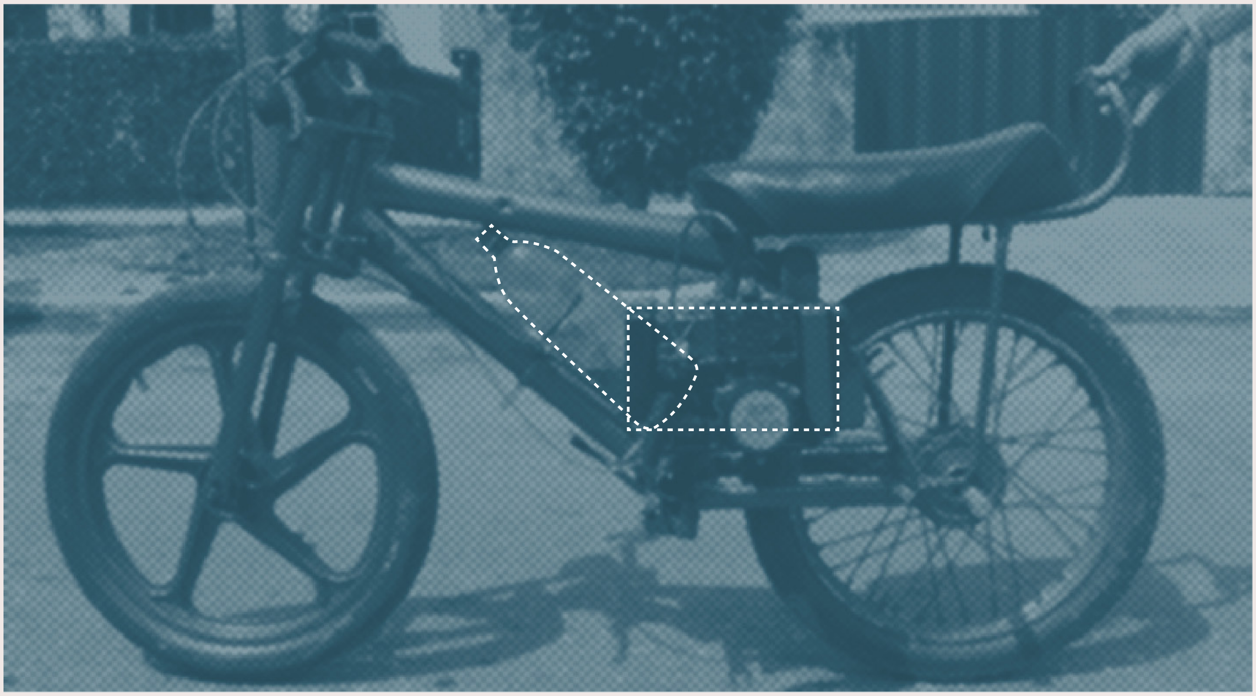


Fig. 73 *Rikimbili/Modified Motor Bike*, photograph with drawing overlay, 2005.

Fig. 74 *Facade Extension*, photograph, 2012.

The networks of care and maintenance can also be seen at the scale of the building, displaying a similar spirit of resolver. Facades of buildings continue to be renovated, extended, and altered using local knowledge that explores different techniques of material alteration and subsequently their implementation. (One such instance of this spirit can be seen through the Potential House: the process by which architectures are constructed through the salvage and banking of materials over time in order to alter architecture and in turn maintain it). This can almost be understood as a homeostatic process, in which materials non-traditional to architecture are recycled so as to endow life to buildings, concurrently staving off and displaying states of entropy and decay. This process can also be understood as inward-focused and auto-catalytic: growth of architecture in the city of Havana through maintenance and care in a closed-loop system, in contrast with urban sprawl. The house becomes plastic – it has the ability to change its spaces through reuse.

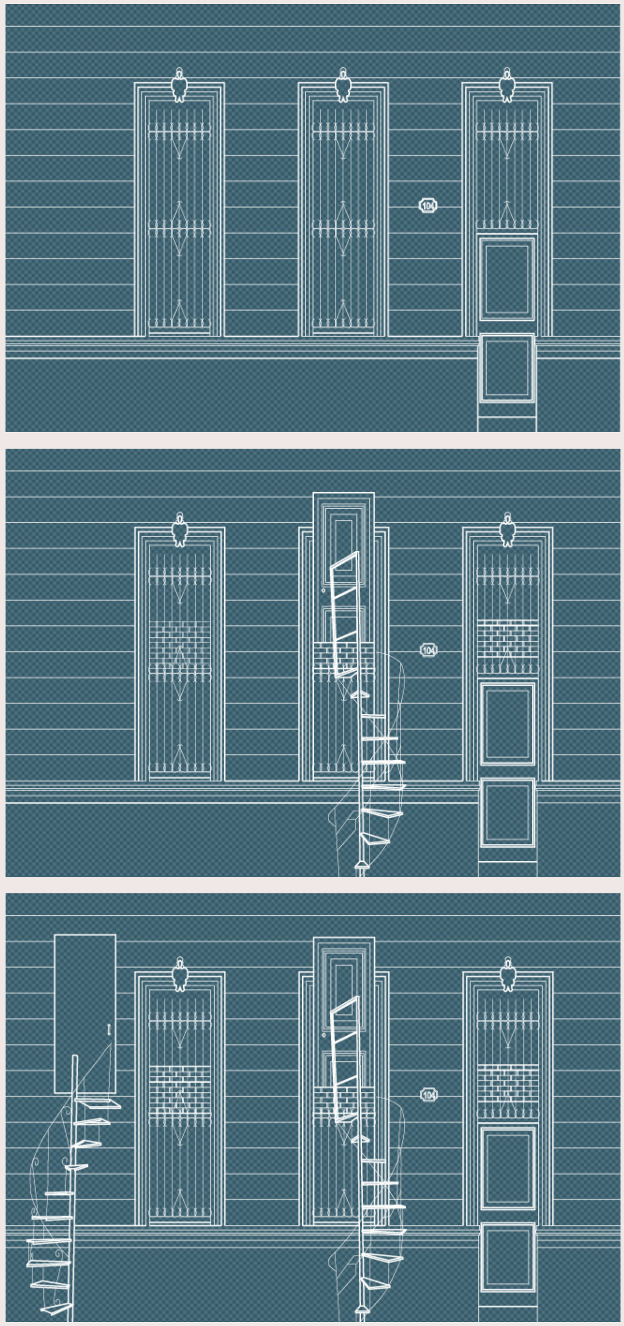


Fig. 75 *Facade Extension*.

Fig. 76 *Facade Extension*, photograph, 2011.

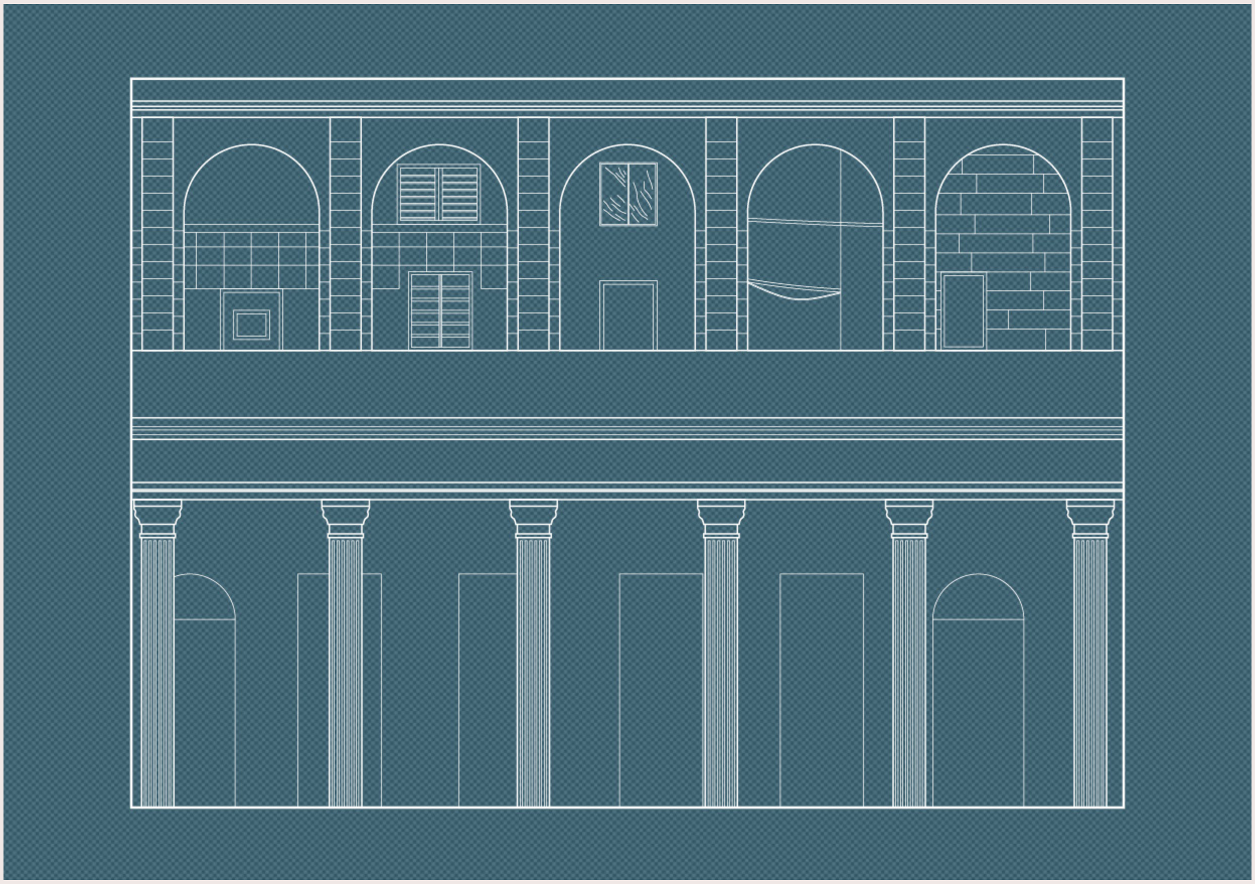


Fig. 77 *Facade Extension.*

Fig. 78 *Facade Extension*, photograph, 2012.

Fig. 79 *Facade Extension*.

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List of Figures

List of Figures

List of Figures